COAL AGE

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WE are nearing the end of our first year's work, and on Oct. 19 will issue a special number of Coal Age to commemorate the proud distinction of having attained to the age of ONE. In our birthday number we will divulge our plans for an educational campaign, which we know will result in the betterment of all those who are engaged in the production and sale of coal.

Today we want the attention of our readers on the matter of co-operation. There is no desire on the part of Coal Age to secure something for nothing. Each individual who reads this journal must pay the regular subscription charge, and in turn we insist that all contributors accept payment for articles and news which are received and published.

This give-and-take plan of strict business procedure permits us to follow a policy of independence which is absolutely essential to the attainment of honest and lasting success. We invite suggestions from all, but accept dictation from none. Although originated and conducted as a private commercial enterprise, we view our work as a trust of good faith and aim always to shape our course in strict accord with the wishes and best interests of the majority.

The idea now prevails that the pages of this paper are an open forum where any reader can discuss all subjects and express his views freely. This belief is absolutely justified and is a true conception of the exact situation we have worked to create. However, we do require an exercise of common sanity on the part of those who use our space, and in the expression of unusual views or personal criticism the writer must show good faith by attaching his name and thus assuming responsibility.

Coal Age has steadfastly refused to sit as supreme judge of "what is what" in coal mining. Our editorial views are merely the opinions of a few individuals who make no claims to infinite wisdom. To us a "man is a man" whether he be fireboss, foreman, superintendent or president, and the latter, if he is too big or too busy to read this journal, is less desirable than a subordinate who profits by the matter we print.

And, to return to the question of co-operation: We are fully aware that the greatest good will result from the greatest number entering into our discussions. We are a help to the industry, but the industry is a necessity to us. If every one of the 8000 readers of Coal Age could be induced to subscribe an occasional article or opinion, we would attain results plainly measurable in the material betterment of the business and all engaged in it.

To be concise—we want every reader who can possibly do so to submit us a description of some mine, method or device with which he is familiar, and which has some feature of interest to other coal men. All articles of this kind should be accompanied by drawings or photographs, or both, as the text demands. And don't forget our standing offer of $20 to anyone who will write a foreword which is accepted and published on this page. Discussions prepared as a foreword, but printed in our department known as "Ideas and Suggestions" are paid for at better than our regular space rate.

Then there is another feature we propose to add to our paper immediately, and that is the publication each week of one or more pages of typical coal-mining views. Hundreds of our readers play at amateur photography, and we now offer them a limited market for the product of their efforts. Each photo must show some uptodate installation or interesting phase of the coal business, and be accompanied by a brief explanatory caption or a longer description.

Lastly, there is the news section of our paper, for which we invite the contribution of all items of any consequence. In this department we desire to record each week the movements of individuals and changes in the personnel of companies. It is likewise our ambition to briefly chronicle important happenings and proposed new developments in every field.

A "get-together" policy on the part of all coal men will do more to quicken the industry and advance the interests of each individual, than any possible plan of action based on independent effort but lacking unity of purpose.

Ideas and Suggestions

Interesting Talks Submitted in Response to Our Recent Request for Forewords.

Mining on the Day Wage Basis

By G. M. Shoemaker*

Two articles in the Sept. 7 issue of Coal Age entitled "A Poor Hand with a Pair of Jacks," and "The Sociology of Coal Mining" has prompted this article. We have Schools of Mining and Coal Institutes, why not a "Coal Diggers School"?

The mining schools and coal institutes turn out material from which it is supposed chief engineers and managers will be made. But what good to a coal company is a manager or chief engineer without the coal diggers?

The supply of coal miners is not as plentiful as the average operator would like. Especially is this true in organized fields. Where is that part of the country, now entirely organized, to obtain its coal diggers when the present supply dies out or have outgrown their work?

The rules of the miners' unions are such as not to encourage apprenticeship.

Coal digging is a good trade and a well paid one to the worker. It is hazardous but no more so than railroading, structural-iron work, and many other vocations. The opportunity to earn a better wage is afforded in coal digging than in many other industries equally as dangerous.

In the metal mines experienced men known as "Shift Bosses" are employed to direct the efforts of "muckers" or inexperienced men in getting out the ore. Why not employ shift bosses in the coal mines and make use of some of our inexperienced men?

One experienced man at a fair day's wage can so direct the efforts of five or six inexperienced men as to make wages for himself and his crew and at the same time act as an instructor for the men under him. Bad or undesirable places can thus be worked and a tonnage obtained from them, where otherwise they would remain idle. The company will lose the profit on the explosive used but they will obtain coal that would otherwise be lost or mined at an excessive cost.

The "Gin Hand" usually so plentiful around Southern mines could be used for this work. If he has any ability he will soon graduate as a coal digger—profitable to himself and the company. He will note how the holes are drilled, the amount of explosive used, the manner in which the timber is set, the road laid, slate or refuse handled and the number of cars he loads and comparing the latter with his day wage he will soon decide he can do better for himself. Sometimes a graduate comes back for a post graduate course but most of them keep their "sheepskin."

This is not merely an idea but a system I have tried and proven and have in use today. Portions of a mine, once thought to be unworkable, are now being worked at a profit, jointly with the process of education.

*Manager, the Virginia-Lee Co., Pennington Gap, Va.

Efficient Mine Management

By Samuel McMahon*

The opinions of mining men differ in regards to the proper definition of the word, efficiency. Many think they have obtained the ultimate refinement in efficiency, when in reality they are not efficient in any department. A man may be making money at a certain mine without the least effort on his part and yet be looked upon as an efficient manager. On the other hand, one who is not getting returns for his stockholders usually has to step down and out. In many instances the man who is obliged to walk the plank has the successful manager discounted in every way.

Take for instance some of the mines in the Central Pennsylvania field. The coal there runs from 30 to 34 in. thick and strict union rules with the 8-hr. day, are in effect. What chance has the manager in that field against one in a district with 6 to 8 ft. of coal, paying a lower wage scale and working one hour a day more? And yet, strange as it may seem, I know of a company working under both of these conditions and obtaining the best results at the low-coal operation.

The earnings of any company depend on the way the mines are managed, and this regardless of the way they are equipped. All coal men are familiar with the mine where neither expense nor labor was spared and which is still unable to deliver the goods.

The Ideal Manager

Take a mine for instance with a good brainy, well experienced mining man in charge. As he goes through the mine he sees all the defects and is shaping up schemes and plans to remedy them. His foreman and firebosses all know him to be a man of honesty and ability and they are always sure of a hearing and good advice from him.

He is as readily accessible to the trapper boy as the chief engineer, but yet a man whom you cannot be lightly familiar with. On the whole a sober, steady, painstaking man, ready to see and remedy a wrong regardless of creed, color or nationality.

His enthusiasm, honesty of purpose, conscientiousness and experience with human nature, arouses the best there is in his men—often in spite of themselves. The under officials are bound to be caught by the big man's spirits, and the result is a keenly alert official personnel throughout.

If you are not following this rule Mr. Superintendent, change your methods. It is not going to detract anything from your intelligence to try out a scheme that is not altogether of your own making. Do not be afraid to say to your assistants, "Let us try and form a plan of action for this particular piece of work," or to let them have an opinion or a voice in planning. It is a wise man who follows the injunction: In a multitude of counselors there is wisdom. Don't think that to take advice from a subordinate

*Russelton, Penn.

official is going to lessen your dignity in the least. Carnegie always ascribed his success as due to his men, and the meanest man on the job may be able to give you a pointer.

At least remember that anyone who is intelligent enough to ask a question is worthy of an answer; give him a hearing and you will be surprised how often it will benefit you. Learn to put yourself in the man's place. Do with him as would like to be done by; we all have our little individualities but it is surprising how similar one man's nature is to another's under similar circumstances.

Suggestions for New Superintendents

By Pennsylvania Engineer

The superintendent of the mine must be an organizer and a man who understands the workingmen. Many well educated men, some having excellent theories for manufacturing coke or getting out coal, fail because they do not organize their work and have no system.

A superintendent should hold one general meeting of all his assistants at least once a month. At these meetings he should go over with them the best and most economical methods of producing coal. This creates more interest among the men in their work and not infrequently results in valuable suggestions.

At one time if a man could produce the coal, that was all required of him. It did not matter in what shape he left the mine so long as the coal was cheap. If the entries ran into troubled ground or a squeeze appeared, that section of the mine was abandoned. But today it is as much as a superintendent's position is worth to have a squeeze in his workings, and if he encounters a fault he must devise ways and means for working around it. And so the superintendent of today must be a smarter man than his predecessor.

I believe that the present-day superintendent should be equipped with a thorough engineering education. Only such a man is capable of dealing with the complicated haulage or drainage problems common to the large operations of today. He should also be well posted on machinery, for, as is well known, men are forsaking the mine and being replaced by machinery more and more.

It is not my intention to discourage those aspiring to a superintendent's position, but I am firmly convinced that the situation is much as I have outlined it. The day of experiment is past and to avoid the mistakes of our predecessors, we must study and read continuously in order to keep up with modern methods. I believe a consistent reading of good technical literature an education in itself.

A New Era in the Purchase of Coal

By Harry N. Holmes*

The purchase of coal on the basis of the actual fuel value it contains is a comparatively new innovation to the industry and one which will tend to eliminate uncertainties and reduce the selling end of the business to an exact science. This method was first adopted by the U. S. Government and is now being taken up by many large consumers.

*Earlham, Ind.

When my lady buys white diamonds, she values them according to their weight and general beauty. When her lord buys black diamonds to shovel into the furnaces of a great money-mill whose *raison d'etre* is my lady's taste for white diamonds, he buys with the same generality of appraisement.

That is, he knows how many tons, the size of the lump, and if the fuel be anthracite or Pocahontas, but he has no more exact standard of the real fuel value of his coal than she of the real beauty of her diamonds.

Beginning of the New System

Yet, to be truthful, we must date our statement back five years. In 1907 the United States government began buying most of its coal on the basis of the actual heating value measured, in British thermal units, by the most scientific methods. The venturesome Treasury Department had previously tried the ice without disaster. Now, the purchase of coal by a large number of firms is done on a purely scientific basis.

Owners of gold mines have always been obliged to sell their ore according to the exact content of the precious metal, not on the mere statement that the famous Comstock or Croesus mine produced the quartz and that it should bring a flat two thousand a ton. Even the owner of a gold brick is required to answer annoying questions as to the exact thickness of the gilt. Nor does the farmer show any lack of business sense in the purchase of fertilizers on a guaranteed analysis.

Nearly all factories use coal, and yet the majority expend their penny-saving powers upon every department but the fuel. A variation of 10 per cent. in the heating value is common, and the loss to the consumer may annihilate a hundred minor economies.

Coal is made up of combustible material, ash and moisture, with a peppering of sulphur as a reminiscence of the lower regions. The combustible material is what one should pay for as all the rest is an actual detriment. Sulphur forms hard clinkers, clogging the grate bars, while moisture consumes heat in steaming and ash is often quite an expensive factor because of the cost of handling, and its interference with draft. Ash in commercial coals varies from 4 to 25 per cent., so the need of exact analysis is evident. Government tests indicate that coal containing 40 per cent. ash has no steaming value whatever.

Advantages of the B.t.u. Method

The consumer should pay for what he gets and get what he pays for. Coal operators are prejudiced against B.t.u. contracts until they try them, but a fair understanding deals justice to both parties. The bidder is allowed to specify the quality of coal he proposes to furnishes and this affords a basis for settling disputes as to the quality delivered and the price, if the fuel be either better or worse than guaranteed. Although contracts permit the rejection of coal below a certain grade, in practice, the cost of removing from the bin, added to trouble and delay, generally results in the consumer accepting it—with penalties—when it can be used at all. The operator, of course, would rather pay the penalties than have his coal rejected.

The national government buys $7,000,000 worth of coal annually, most of it on the basis of heat units, for the departmental buildings in Washington, the Panama canal work, the navy and buildings all over the United States. The contracts are separate, each one being assigned to the lowest bidder, and range from three hundred to twenty thousand tons. Not only does the government get what it pays for, but the stimulus of bonus and penalty has forced a noticeable improvement in the quality of coal delivered. Uncle Sam's example has been followed by others, and now enormous contracts are made on this basis. The Interborough Rapid Transit Co., of New York, buys thirty thousand tons a month on a B.t.u. basis and a single firm in Chicago handles a million tons a year by similar contracts.

Some Practical Applications

To understand the contracts one should know that a British thermal unit is the amount of heat required to raise 1 lb. of water 1 deg. F. A pound of the best dry coal may yield as high as 15,000 B.t.u.

The New York company selects a range of 14,101 to 14,150 B.t.u. as the standard

for 1 lb. of coal. If the analysis of the coal delivered shows a drop of 500 B.t.u. below this standard, 10c. a ton is deducted from the price and at the same rate for other variations. Of course, if the B.t.u. value is 500 in excess of the standard, the dealer gets the benefit of a corresponding increase in the price.

Their standard ash content is 9 per cent. If this runs as high as 9½ per cent. the deduction is 2c. per ton and so on, at the rate of 4c. for each 1 per cent. increase. Corresponding deductions are made for excessive volatile matter.

Uncle Sam's contracts arrange a standard B.t.u. value, and if the coal actually analyzes, say 2 per cent. more or less, the price is increased or decreased accordingly. For all coal which analyzes less ash than that specified in the contract, the dealer is paid a premium of 1c. per ton for each per cent. difference. An increase in the ash content of 2 per cent. over the standard is tolerated without penalty, but a higher increase is penalized by a sliding scale.

The Chicago firm before mentioned receives bids which are reduced to the number of B.t.u. obtained for 1c. and accepts the one giving the highest value—providing the coal is suitable in all other respects. The bidder takes a representative sample of his coal and has it analyzed by a reliable chemist. Then he offers to furnish coal of, for example: 11 per cent. moisture, 20 per cent. ash, 11,346 B.t.u. per pound dry coal at $1.35 per ton.

Contracting on the B.t.u. System

The buyer then proceeds on accepted scientific lines to compute exactly what he is getting for 1c. Since the *dry* coal yields 11,346 B.t.u., the coal *as delivered* with 11 per cent. moisture must yield 11 per cent. less, or only 10,098 B.t.u. Multiplied by 2000, this yields 20,196,000 B.t.u. per ton as delivered. Now the price was stated as $1.35, but the 20 per cent. ash is estimated to decrease the value one-half that percentage in cents per ton; that is, 10c. This makes the real price not $1.35, but $1.45 per ton. If the ton delivered furnishes a total of 20,196,000 B.t.u. for $1.45, then 1c. buys 139,282 net, which is accordingly made the contract guarantee.

COMPARISON OF COAL VALUES

Kind of Coal	Moisture. Per cent	Dry Ash. Per cent.	B.t.u. per lb. of dry coal	Price Net	B.t.u. per 1c.
(A) Cartersville Screen.....	14	16	12,103	$1.65	120,330
(B) Pana Screenings....	13	19	11,296	1.40	131,406
(C) Springfield Screenings....	11	20	11,346	1.35	139,282
(D) Decatur Screenings....	12	23	10,863	1.30	135,115

The above tables show a number of different bids received in Chicago. If price per ton only had been considered, the purchaser would have made a serious mistake, as the lowest price was not by any means the cheapest (D). If the heat in the coal only had been considered, the purchaser would have again been wrong, since the fuel having the highest B.t.u. value was not the cheapest (A). As it was, he used the net B.t.u. for 1c. and bought the coal showing the highest actual value (C).

The bidder frequently selects a better sample than the average output of his mine justifies, so the delivered value is often below that specified. Without a contract along the lines mentioned the consumer's loss may be quite large because of the fluctuations in ash and moisture.

Comparison of Different Fuels

This Chicago firm has an interesting method of computing the delivered values. The bid (C) in the table actually analyzed: Moisture, 12 per cent.; dry ash, 22 per cent.; B.t.u. per pound of dry coal, 11,022. Since 12 per cent. of this coal was water the B.t.u. per pound delivered was 12 per cent. less than 11,022, or 9700. For a ton this amounted to 19,400,000 B.t.u. The contract price was 139,282 B.t.u. for 1c. Dividing the 19,400,000 by 139,282, this gives a value of $1.39 per ton. However, the 22 per cent. ash is assumed to reduce the value 11c. a ton, so the real delivered value is $1.39 less the 11c., or $1.28, a saving of 7c. per ton to the consumer.

While this may appear complicated at first glance, it is, nevertheless, an efficient system. Neither dealer nor consumer gains or loses by the change in the moisture content of the coal between the time it is weighed at the mine and on delivery. The adjusted price per ton becomes correspondingly lower if the coal is wet and higher if dry.

It is well worth while to note the experience of the Government in 1908. Thirty contracts were let for bituminous coal to be delivered in several states. Of these, three were slightly better than the dealer's estimate or contract guarantee, one the same, and 26 below par, these latter suffering penalties. The deduction on nine amounted to 20c. a ton, one being as high as 62 cents.

Adjusting Differences

The consumer has the analysis made, but a few days' time is always allowed the dealer to protest and have a part of the sample (which has been sealed and set aside for that contingency) analyzed by a chemist agreed upon by both parties. This second analysis is binding. There is usually little difficulty on this point.

Sampling the coal is a vital feature of correct analysis. Slate works down to the bottom of a car while in transit and samples from the top often show 8 per cent. less ash than those from the bottom. It is essential, therefore, to shovel out representative lumps and finer stuff from all parts of the car, in all about 100 lb. This is crushed, quartered, a quarter saved, crushed finer, spread in a circle, quartered and the process continued until about a pint of dust is left. This is sealed, to prevent loss of moisture, and sent to the analyst.

As a rule, samples from all the carloads delivered in two weeks or a month are united and one analysis made of the whole. Two standard calorimeters are in use for measurement of the heat value, one the Berthelet bomb, which burns the coal in compressed oxygen, and the other the Parr, which burns the coal in sodium peroxide. Only a well-trained chemist can operate them accurately.

The B.t.u. system is a blessing to the consumer in at least three ways. It enables him to recognize the bid which really gives the most heat for the money and protects him from the substitution of inferior coal or, in other words, it rigidly binds the bidder to the quality of the original sample. Third, the rebate on coal below contract grade insures his paying for exactly what he obtains.

Verily, a business millenium is at hand. We shall soon buy stocks on the basis of their anhydrous value, their percentage moisture being determined by an Interstate Commerce Commission.

Rescue Work in Mines

Special Correspondence

At the final meeting of the session held by the British Association for the Advancement of Science at Dundee, Scotland on Sept. 12, Thomas Reid, of Birmingham, read a paper on rescue apparatus for mines. He said that the present types should be replaced so that in future it would be possible to have apparatus which could be used without special training. He proposed that a high-pressure distribution pipe, provided with valves at short distances, should be laid in all mines. From this miners could draw supplies of air, only a simple arrangement being necessary.

The air could be supplied to the headdress by tubes. Professor Galloway said that the proposal would require to be worked out before an opinion could be safely expressed. There is great difficulty in maintaining a large number of air pipes through the workings of mines. Workings are always advancing, roofs caving and it is difficult enough to maintain electric cables without confronting the further difficulty of maintaining pipes except on the main roads. It is probable that after an accident, a man who would have to use this system would be a considerable distance from the pipe lines and in that case dragging the pipes would be quite as much an impediment to progress as carrying a generating apparatus. Mr. Reid replied that these were ordinary difficulties which needed only consideration and experience to be successfully met.

British Coal Cutting Machines

By W. Bolton Shaw

The rotary types of British coal cutters work wholly on the long-wall plan, cutting from side to side of the coal face instead of by sumping cuts. The disk machine is best suited to hard coal on an even floor. The flexibility of the chain and bar cutters makes them more generally available where the floor is uneven, but less able to attack impure or hard-cutting coals.

Abstract of paper read at a meeting of the Manchester Association of Engineers.

Coal-cutting machines may be divided into two classes: (1) Percussive, which imitate somewhat closely the action of the coal-miner's pick; and (2) rotary, in which the action is similar to that of an ordinary machine saw or milling cutter when used for cutting grooves or slots.

Percussive machines are almost exclusively used for driving headings and for room-and-pillar work. There are two types of this class of mechanical coal digger, the "pick machine" or "puncher," and the "heading machine" or "header." The puncher is the machine which most nearly approaches to the collier's pick, as it is to all intents and purposes a hand tool, directed and controlled almost entirely by hand.

The Heading Machine

The heading machine more nearly resembles a fixed machine tool, as it works from a fixed column and is directed and controlled by hand-operated gear. The compressed-air heading machine is really a modified form of the ordinary percussive rock drill. Its stroke is considerably longer than that of the latter, and the machine is mounted on a bracket attached to a vertical column and provided with arrangements for slewing, tilting or forward traveling.

The Rotary Cutters

There are three classes of rotary coal-cutting machines: The "disk," "chain" and "bar" types. In the disk type the cutting member consists of a large disk carrying cutting tools on its periphery, and its action is similar to that of a circular saw.

The cutting member of the chain machine consists of a chain, of which alternate links carry cutting tools, and its action may be compared to that of a band saw, with the saw working in a horizontal plane and having its teeth on the side of the band instead of on the edge.

The English bar type cuts by means of a long bar carrying cutting tools which project radially from it. The bar rotates at a high speed, and in its cutting action resembles a side milling tool of great length and small diameter.

The disk, chain or bar projects from the side of the machine, to which it is attached by a bracket or other similar device The body of the mechanism consists of a framework carrying the motor or engine, the gearing and the controlling device. The movement of the machine along the face is produced by a self-haulage mechanism.

Rails Have Given Place to Skids

In the earlier machines, flanged wheels were provided so that the machine could run on rails, but now most machines are made to run on a pair of skids similar to the runners of a sled. This idea originated in America. The skids provide a much firmer base for the support of the machine; the labor of laying and relaying lengths of rails is saved and the slight amount of extra power required to move the cutter is negligible.

In the early days of coal cutting, all machines were actuated by compressed air. Now, however, electricity is most largely used for the chain and bar types, while for the disk the number of air and electrical machines in use is about equal.

The Disk Coal Cutter

Referring to Fig. 3, the disk, made in halves bolted together, is carried by a bracket attached to the side of the machine and works on a boss near the outer end of that bracket. The disk has teeth *A* near its periphery and is driven by a bevel wheel *B*, which gears with these teeth. The center of the wheel is connected to the outer ring by flat spokes *C*.

The inner edge of this outer ring is provided with an overhanging lip *D*, which runs on a corresponding lip, which is not visible in the drawing. Its location

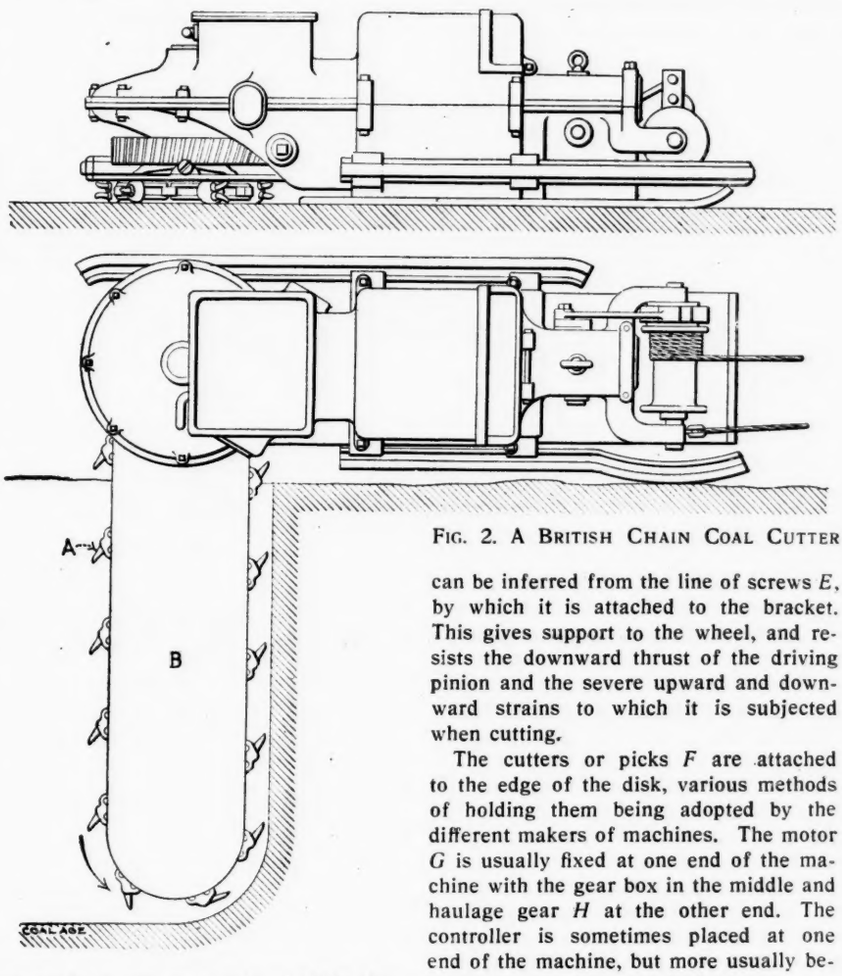


Fig. 2. A British Chain Coal Cutter

can be inferred from the line of screws *E*, by which it is attached to the bracket. This gives support to the wheel, and resists the downward thrust of the driving pinion and the severe upward and downward strains to which it is subjected when cutting.

The cutters or picks *F* are attached to the edge of the disk, various methods of holding them being adopted by the different makers of machines. The motor *G* is usually fixed at one end of the machine with the gear box in the middle and haulage gear *H* at the other end. The controller is sometimes placed at one end of the machine, but more usually between the gear box and the haulage.

Motion Along the Face

The haulage gear consists of a rope drive on which is wound one end of a flexible steel rope. The other end is taken round a snatchblock attached to a prop set firmly some 60 or 90 ft. in advance of the cut, and brought back and fixed to a hook on the body of the machine.

The drum is driven by a pawl and ratchet device worked by a connecting rod from a crank on the main driving shaft. The feed of the ratchet, and with it the traveling speed of the machine, can be adjusted to suit the cutting conditions.

In addition to the skids on which the machine slides over the floor, side skids are provided, one of which (shown bow-shaped in the figure), slides along the face of the coal and the other *I* along a row of props set parallel to the face.

The picks make their cut outwards from the back to the front of the cut. The resistance to their cutting action produces a torque on the machine, which tends to drag its front end in toward the coal face and thrust the back end into the gob. The side skids oppose this tendency, and keep the machine parallel to the face.

The machine can cut in either direction along the face, the cutters being reversed and the face slide moved to the other end of the machine when the latter makes the return cut along the face.

The Chain Machine

The chain machine is shown in plan and elevation in Fig. 1. The chain to which the cutters are attached is carried by a flat jib *B*, bracketed to the under side of a circular head carried by the framework of the machine. The head can be rotated about a vertical axis by means of a worm and circular rack, so that the jib may be slewed in and out of the coal or round to the other side of the machine when a cut is started or finished, or when the machine is cutting in the opposite direction along the coal face.

The chain passes round an idle pulley at the cutter end of the jib and round a driving sprocket at the machine end. The sprocket is fixed on a short vertical shaft, the center line of which coincides with that of the circular head, and which is driven through gearing by the motor or air engine.

The chain, as it runs along the side of the jib, is guided by the projecting edges of the top and bottom plates, of which the jib is built up. The chain when cutting runs against the bottom of the rectangular groove formed by the longitudinal distance piece between the cheeks of the jib, and in this way the chain is supported against the inward thrust and other strains to which it is subjected when cutting.

Manner of Propulsion

The length of the jib can be slightly adjusted to compensate for any stretching of the chain. The self-hauling gear is similar to that of the disk cutter. The motor or engine is in the middle of the machine and the controller is placed between it and the haulage gear at the chain end.

The main gearing consists of a bevel pinion fixed on the motor shaft driving a large bevel spur wheel on the sprocket shaft; or else the motor bevel pinion gears with the bevel spur wheel fixed on an intermediate vertical shaft, which drives the sprocket shaft by a pair of plain spur wheels. A worm-gear drive is also employed, the sprocket shaft carrying the worm wheel and a horizontal intermediate shaft the worm. The intermediate shaft is driven by the motor through a pinion and spur wheel.

Not So Much Inclined to Slew as Disk Cutter

The machine is provided with floor and side skids as in the disk, but the tendency of the machine to drag in to the face at the front and to thrust out against the props at the back is much less than in the disk machine. The outward tendency at the back end is largely balanced by the inward pull of the cutters.

The inward tendency of the front end of the machine is due to the leverage of the back thrust of the picks on the side of the jib, while in the disk machine, in addition to a similar leverage effect of equal intensity on the disk, there is also a heavy horizontal twisting torque due to the tendency of the disk to stand still and the machine to run round it.

The Bar Machine

The development of the bar machine is chiefly due to the work of Frederick Hurd and his son. The elder Mr. Hurd was one of the pioneers of the coal cutting machine, and appears to have been the first to design one in which all the working parts, except the cutting members, were completely enclosed. A sketch of this machine is shown in Fig. 3.

The bar which is circular in section tapers towards its outer end and has a coarse rectangular thread or spiral running along the cutting portions. It is carried by a long bearing fixed in a circular head attached to one end of the machine.

This circular head is capable of rotation in a horizontal plane about its center line, and in a vertical plane about the center line of the machine. By these two movements the cutter bar can be respectively slewed like the jib of a chain machine or tilted so that its outer end is raised or lowered.

The motor or air engine *B* is in the middle of the machine and the main driving gear is fixed inside the circular head, which forms the gear box. The hauling gear *C* is at the front end of the machine and the controller is placed between the haulage and the motor.

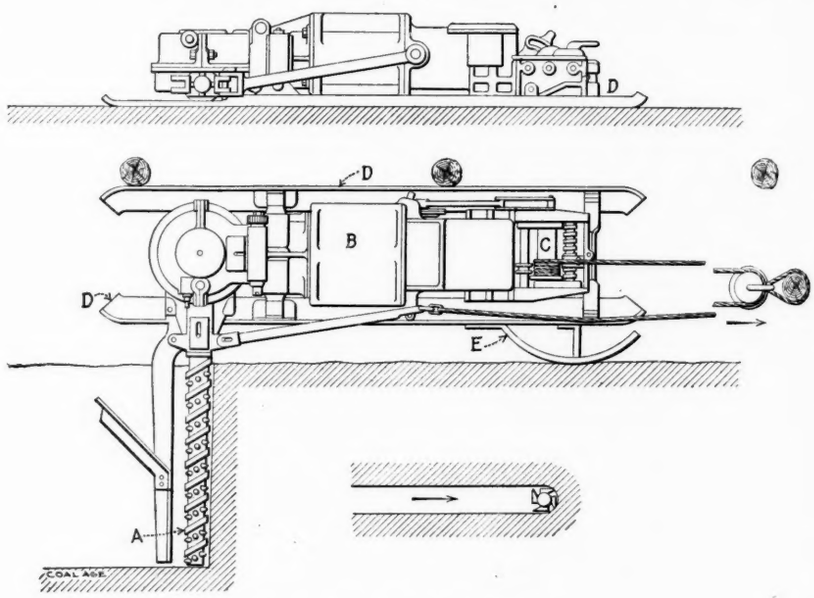


Fig. 2. The Bar Coal Cutter

How the Machine is Guided

The machine runs on skids *D* made of angle iron, the vertical flange of which serves as a side skid against the props and a face skid *E* is forced at the leading end of the machine to run against the coal. The tendency of the machine is to push out at the back and draw in to the face at the front end but like the chain machine its outward thrust is less than that of the disk cutter, and when cutting well it can be run without being held in at all by the props.

It can cut in both directions along the face, the machine being turned completely round and the bar slewed through 180 deg. for the return as in the case of the chain type.

The cutting action of the picks gives a tendency to the bar to "climb" up or down in the cut according to the direction

of rotation. When the undercutting is in hard under-clay, the bar also has a tendency to rise into the softer coal and the direction of rotation is arranged so that the two tendencies oppose one another. In this case a right-handed bar is used for cutting in one direction along the face and a left-handed bar for returning.

Comparison of Machines

The disk machine has great strength, and under given conditions has advantages in that it will give a better output in hard underclay cutting; the chain machine is adapted for cutting in "tender" coals and the bar cutter cuts best in softer fire-clay or coal.

Owing to the large area covered by the disk, all "spragging" is necessarily some distance from the front of the cut, so that the coal if "tender" is liable to break away, and may sometimes fall over onto the machine itself to the danger of the attendants. The jib of the chain machine being narrow the coal can be spragged fairly close up to the solid.

The picks themselves are practically the only parts of a chain cutter which are in motion under the coal, consequently falling pieces of the latter affect it very little. The bar machine permits spragging almost right up to the solid, so that it is particularly well suited to tender coals and there is little likelihood of the coal falling onto it injuriously.

The Disk Machine Does Not Work Well Where Floor is Uneven

There is difficulty in manipulating the disk if the floor is uneven, the chain cutter can deal with unevenness of floor without much difficulty and the cutter bar can do good work with a rolling floor, and is able to surmount small faults in the seam with little difficulty as, in addition to tilting, the the whole bar can be raised or lowered bodily.

The disk machine cannot cut itself in at the beginning of the cut; and where the disk is in the middle of the machine cannot cut right up to the end of the face. The chain can cut its way into the coal at the beginning of the face, and by being turned round when near the end of its cut, can cut backwards to the end of the face, and so make a complete cut.

The Bar Machine Would Lead All Cutters if it Could Cut Hard Coal

The bar machine, like the chain, can cut its way into the coal, and complete its cut right up to the end of the face. It is probably the type of machine best adapted to overcutting, provided the cut has not to be made in very hard fire-clay.

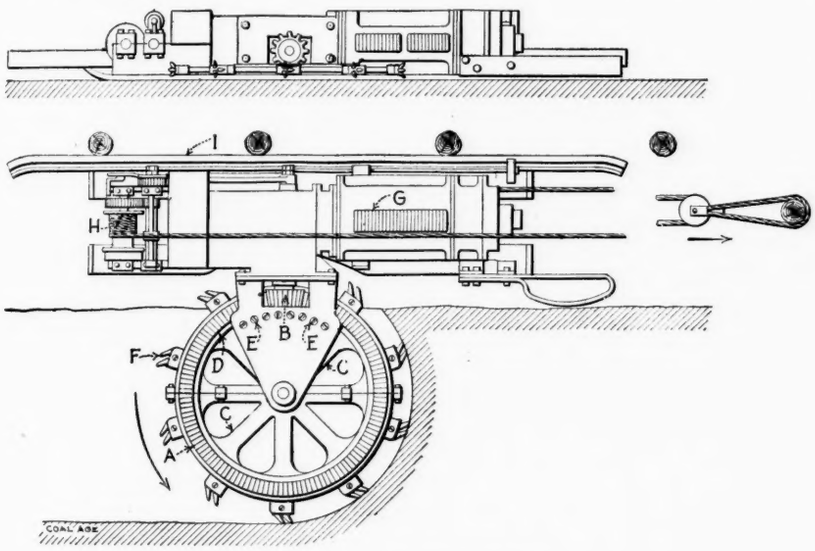


Fig. 3. The Disk Coal Cutter

Notwithstanding the greater amount of power which must be taken for the actual cutting action, because of its greater disintegration of the material cut, the power required to drive the machine is moderate, because of the small amount wasted in churning and friction.

For direct current machines the ordinary height is about 18 in., and 22 in. to 24 in. for three phase, while the average power taken for driving varies from about 15 hp. to 30 hp., according to the type and capacity of the machine. The standard speed of cutting appears to be about 250 to 300 ft. per min. for the disk, 300 to 400 ft. for the chain, and 500 to 600 ft. for the bar.

When direct current is used the series motor is generally adopted for disk and chain machines, and the compound motor is used to drive the bar cutter. In three-phase machines, slip-ring motors are used for the disk, and both slip-ring and squirrel cage for the chain; the squirrel cage type is used on the bar machine. The latter is the simplest and safest type of motor for mining work. Generally speaking, three-phase motors can be made safer than direct current.

Compressed Air vs. Electricity

As I view it the suspicion thrown upon electricity in connection with certain recent explosions at collieries is not justified. It has led to more serious consideration of the possible risk involved in the use of electricity for coal cutting, and may result in legislation leading to a considerable increase in the use of compressed air.

I am of the opinion that probably the chief reason for commending the compressed-air machine is furnished by the fact that it cannot fire gas or shock the men who operate it.

A compressed-air machine is also a somewhat simpler piece of apparatus than one driven by electricity because it is purely mechanical; moreover there is little danger of its being damaged by overloading.

It has, however, certain defects which in many cases outweigh these advantages. The efficiency as regards power consumption is very much lower than that of electricity. When electric current is used, the ratio of the power given out by the cutter motor to the power required to drive the generator may be taken roughly as 70 per cent., while with air the ratio of power given out by the coal-cutter engine to power required to drive the compressor may be taken as in the neighborhood of 35 per cent.

In other words the steam consumption of a compressed-air plant for coal-cutting is about double that of an electric plant. The figure 70 per cent. taken for the electric cutter will not differ much whether the installation is well or badly designed, but in a poorly planned and badly maintained compressed-air plant, a considerably lower efficiency will be obtained than the 35 per cent. taken as representative of a moderately good installation.

The engines of a compressed air cutter, having no governing mechanism, slow up with any increase in the hardness of the cutting, and speed up as the cutting eases off. A certain amount of variation of this sort is advantageous, but beyond moderate limits it becomes a distinct disadvantage, and makes cutting difficult in material of varying hardness.

The cost of concrete overcasts can be greatly reduced by the use of reinforcement. Well screened tough coal can be economically used in place of crushed stone in massive stoppings where the pressure or the danger from fire is not very great. If not well screened too much coal dust is apt to be present, necessitating the use of a large amount of cement.

The Testing Stations Conference

By R. Dawson Hall

An extension of an article in our issue of Sept, 21. The Bureau of Mines is thinking of adding the requirement that explosives shall not markedly deteriorate after a storage of four months. A limit has been set on the amount of carbon monoxide which may be emitted. Two attempts to blow up the experimental mine failed owing to the presence of moisture and to the opportunities for expansion but an explosion on Sept. 20 was quite severe.

It appears that the British government intended to send a representative to the International Testing Stations Conference, but there was some hitch in the arrangements and William O'Connor, of Wales, came on his own charges, in the absence of official instruction, though at the desire of the testing-station authorities in England.

Meantime, Eugene Haanel, director of the Mines Branch of the Department of Mines, Ottawa, Can., was appointed as being on the spot, but press of business prevented his appearance at the conference. Mr. O'Connor took part unofficially in the congress and showed an extremely broad and thorough acquaintance with the matters under discussion.

M. Weiss returned with M. Taffanel to France on hearing of the explosions at Lens, so that country was not represented. Spain, Russia, Sweden and other countries which mine coal were not in the conference, as they have no testing stations and were therefore not invited to send delegates. Consequently the foreign delegates present and duly accredited were but three, Victor Watteyne, Carl Beyling and Julian Czalinski, though Eugene Haanel, J. Taffanel and M. Weiss will take part in the formal correspondence in which the conference will result, having been accredited by their governments.

The Conference on Gas and Dust

The experiments of Thursday, Saturday and Monday, the 12th, 14th and 16th of the month, have already been fully described in our issue of Sept. 21. Less attention has been given to the conferences held on Saturday and Monday. The discussion on the former day was on coal dust and gas. Geo. S. Rice addressed the conference, giving a description of the activities of the Bureau of Mines relative to the avoidance of mine accidents.

Much of his address would be more interesting to the visitors than to our readers, because for the most part he described the methods of work with which they are acquainted. The peripatetic mine-rescue and first-aid instruction car has ceased to be interesting to us, but it is a novelty across the seas, and is a development of which America may be proud, though the primary use of instruction cars was not in the mining industry.

Mr. Rice explained that methane samples have been gathered all over the country and that investigations are being made into the relative quantities of gas issuing from coal at different barometric pressures and to discover what relation the structure and composition of the coal bear to the emission of gas.

The statement was made that 2 to 3 per cent. of methane could be found in the return air of a few anthracite mines. If this refers to the main returns, there is need for increased air currents in such workings. Mr. Rice declared that some mines emitted as much as 1400 cu.ft. of methane per minute under normal conditions. He announced that G. A. Hulett, the chief chemist, had arranged to take samples in evacuated flasks, sealing the small opening with wax.

Cause of Increased Death Rate

He attributed the increased loss of life in the last ten years over that in the previous decade to the increase in the use of explosives in Western fields due to more frequent shooting from the solid, to the fine dust of machines, which is often not loaded out, to the enlarged volume and velocity of the currents required by the greater number of miners in the average mine, to the increase of methane as mines get deeper, to leakages from gas wells, to the lack of skill of the men drawn yearly into the industry, to the inability of the men to talk English, to the insufficiency of foremen, to lack of discipline and technical knowledge and to the growth of the use of electricity.

American Mines Compared with Those of Europe

Mr. Rice regards the solidity of American coal and its freedom from crushing as an element of danger because it has to be won by undercutting and larger charges of explosives are needed to dislodge it than are required by European coal. The entries of foreign mines are often in solid rock. In America the headings are usually in coal and the fallen mineral from the ribs when comminuted by traffic furnishes powdered material for explosions.

The flames of these when once started can extract gases from the solid ribs and so can provide for their extension.

He declared that European mines were the more gassy and being hotter could be less easily humidified. Moreover the weakness of some European mine roofs made moistening objectionable.

A humidity of 90 per cent. if maintained makes the coal dust damp enough to stick together so that an ordinary concussion will not raise it into suspension in the air. Much of the American shale is not suited for stone dusing, being too full of carbonaceous material. That at Bruceton, for instance, has 8 per cent. of combustible matter even when samples are selected for their freedom from bituminous content. We have referred only briefly to the remarks of Mr. Rice, mentioning only those points which are new. But the paper was replete with ideas which his foreign and domestic experience have suggested to him.

I propose later to take up the discussion of Monday, the second day of the conference. The subject discussed was spontaneous combustion and it is so important that I will leave it till later. The work of H. C. Porter is worthy of most careful consideration and seems to bring the problem of the self ignition of coal an important step nearer solution.

The International Congress of Applied Chemistry

On Tuesday the conference with its little band of inquirers was rudely broken by the International Congress of Applied Chemistry. The chemists took the boat to Clairton and visited the Carnegie Steel Co's. plant and in the evening attended a smoker given by the local chemists, an occasion which is said to have had no little of the old world flavor.

On Wednesday, the chemists visited the bureau buildings in the morning and made a hurried examination—too hurried it seemed to them, in view of the interesting experiments being conducted. They then visited by special train the Brilliant pumping station and were served with lunch. Some then took train for Freeport and visited the Guggenheimer distillery, which was not however, in operation and the United States Plate Glass Co's. works at Ford City which pleased them more than the previous exhibits. Several, none of whom were connected with mining, visited the Harwick Mine and explored it above and below ground with most evident interest.

The testing conference, however, continued during the day, the experts attending strictly to the object of their visit. A morning conference was followed by another trip to Bruceton.

The Explosions which Failed

The two explosions tried on this occasion were failures. It will be interesting to ascertain why these failed, if by

any means the reason can be satisfactorily determined. The experimental mine is no longer the dry mine it was a year ago. On Wednesday, water was standing at the face and the humidity of the air was marked and exceeded 90% of saturation.

Only 1 lb. of coal dust per ft, run of heading was placed on the shelves, and it seems probable that in the 1½ hours during which the shelves were loaded and the shot was prepared, the dust became well saturated with moisture. Consequently the failure to explode the mine tends to demonstrate that a moist atmosphere will make conditions underground unfavorable to explosive violence if it continues long enough to moisten the dust even though the powdered coal be of such fineness that about 75 per cent. will go through a 100-mesh screen.

The shot on each occasion was placed in a cased hole in the coal at the end of the main entry. The pipe measured 1½ in. in diameter, was loaded with 2¾ lb. of FFF powder and was stemmed with 4 in. of clay stemming. Shots were fired twice, each time without marked result. The flame of the explosion traveled only 150 ft. and died out.

Dust had been spread on shelves in the last crosscut of the mine; and in the "airway" a Taffanel barrier consisting of 15 boards spaced at four-foot centers had been arranged to restrain the explosion from extending outby. Ten of these boards were covered with shale dust and five with ashes.

They were set on the rails of the airway while beyond them on shelves along the walls for 50 ft. were placed 50 lb. of coal dust. The barrier, of course, was not subjected to any real test because the explosion it had to restrain had not gained any headway when the stone dust whirlwind was encountered.

The Room for Expansion

It has been thought that one of the leading reasons why these explosions failed was the fact that the shot was placed so close to the crosscut that every opportunity was provided for expansion. The most effective condition for detonation is undoubtedly that provided when the heading is unbroken by side passages.

The shot then fires, as it were, into a cannon of large bore, but without relief chambers, and the suggestion borne forcibly home is that shots fired well ahead of a crosscut may be more dangerous than those fired nearby one, and that the English method of working by long wall is perhaps one of the reasons why coal-dust explosions are not as frequent as in our room-and-pillar-and-heading methods.

The Conference on Explosives

It would be well perhaps to detail the meeting of Thursday, the 13th, more elaborately than those proceeding, so that our readers can realize the character of them all. The small number of conferees seated round a large table made the meeting appear more like the sitting of a number of plenipotentiaries extraordinary who were formulating a treaty, than a scientific gathering.

If any difference was evident, it was that there was a somewhat smaller attendance than is customary at gatherings of statesmen when treaties are being prepared.

The first item on the program was the seating of Julien Czaplinski, of Austria, as chairman, a post which has been filled in order among the official delegates. Victor Watteyne had filled the chair before. He is easily the dean of the conference, being older than any of the delegates present. He speaks seldom but to the point and in excellent English.

The unofficial delegate, William O'Connor, spoke, of course, in English, but Carl Beyling and the chairman spoke in German, their words being translated into English by a most competent interpreter of Roumanian extraction, who bears, however, the German name O. L. Swartz. Mr. Swartz is the librarian of the Bureau at Pittsburgh, and his fluency and skill as a translator has done not a little to make the conference a success.

Clarence Hall, in a scholarly manner, introduced the subject and outlined the views of the Bureau relative to the regulations governing explosives. The testing station authorities are proposing the requirement that explosives which fail to explode after being stored for four mouths be stricken from the permissive list.

The argument seems to us unanswerable. Nothing will injure the Bureau of Mines more than giving its approval to explosives which refuse to detonate or fail to detonate satisfactorily; and if it needs the effective support of the industry it should be given ungrudgingly. It is not sufficient to ask, Will the public buy non-explodible explosives? The answer is that such explosives have been bought and used both here and in England which were not fit for use or soon became so.

To show how true this is, one might mention the well known historical fact that when Henry Campbell-Bannerman was the Minister for War in England, he and his colleagues were thrown unceremoniously out of office by a vote of want of confidence because the supplies of powder (cordite) stored in India had materially deteriorated and their worthless character jeopardized the defense of the frontier. News relative to weakened explosives in England is duplicated by news in our own country and it is a source of satisfaction that the Bureau is adding this new test for the good of the industry, the welfare of the Bureau, and the advantage of those powder makers who make explosives of permanent character.

Limit Placed on Poisonous Gases Evolved By Explosives

The Bureau of Mines is now enforcing the rule that 680 grams of explosive on detonation shall not evolve more than 178 liters of carbon monoxide, while it is suggested that explosives which are to be used in metal mines which are less well ventilated and where the flaming requirements are not onerous, shall not evolve when exploded in the Bichel gage any carbon monoxide, hydric sulphide, nitrogen oxides or other permanent noxious gases. It has been found that gelatine dynamite cartridges containing excess oxygen can be made so as to guarantee complete oxidation of all the combustible matter including wrappers.

It is interesting to know that the tests of explosives in America are more severe than elsewhere. The ethane in the natural gas used at the testing station is extremely sensitive, whereas gases escaping from the coal which are used in foreign countries for creating an explosive atmosphere often contain carbon dioxide, consequently they are not even as sensitive as pure methane.

It was shown that where the percentage of methane is high the density of the charge is without effect, the permissible charge limit being unaffected by density.

The visitors responded to the propositions submitted to them and it would be interesting to brief their replies. This we have not done and shall not do in any manner because international etiquette requires that they be given plenty of time to discuss the matters presented. Their answers will be in the form of a report and perhaps further consideration will modify some of the views expressed.

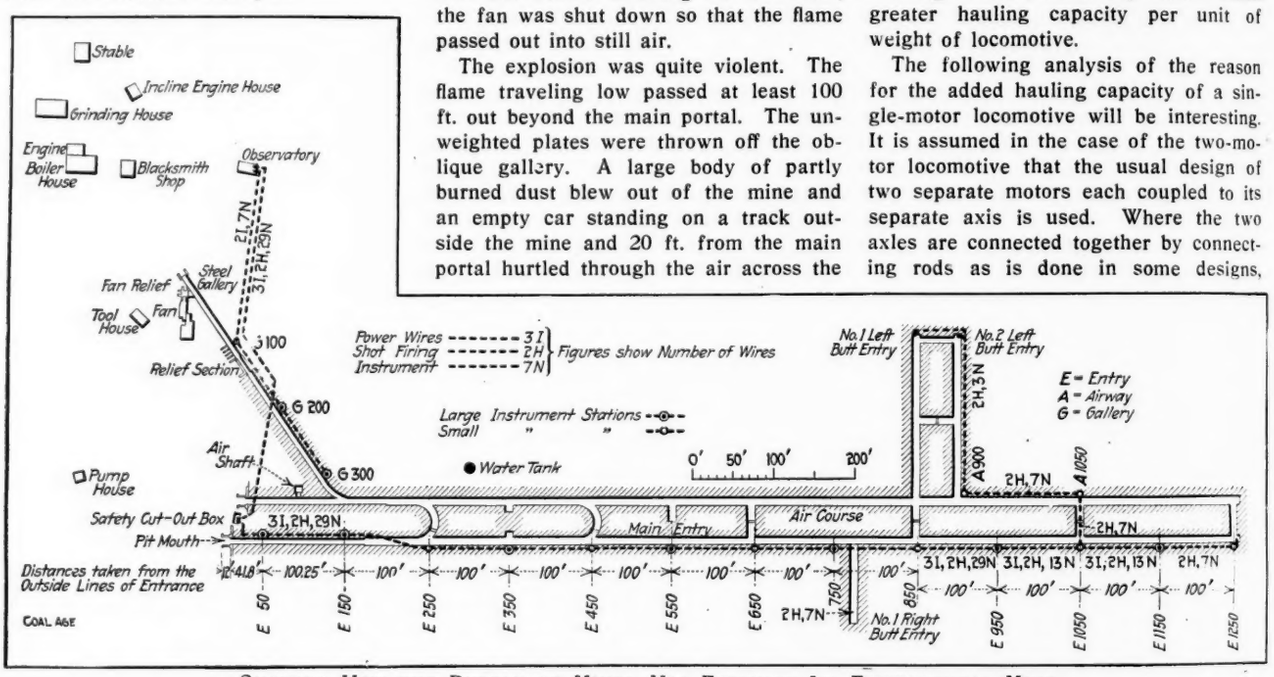
Why Our Explosives Should be Subject to Severest Tests

Great care should be taken to keep our explosives from deterioration. The long distances of transportation, the ineffective control of storage houses, the great variance in our climate and the inexperience and lack of training of our miners are reasons why we should use especial care. The generation of poisonous gases by explosives should be the more closely restricted because working in narrow rooms inefficiently ventilated, we cannot hope to sweep away foul gases as easily as in the faces of longwall workings.

After the close of the meeting, a private session was held and we are told that the meeting organized itself permanently, subject to the approval of the governments represented. The afternoon was given to an inspection of lamps and to the methods of testing, and in the evening a banquet at the Fort Pitt Hotel was given by the members of the Bureau to the visiting representatives.

J. A. Holmes gave most effectively a history of the Bureau from its germ-life in the Geological Survey to the present day. Victor Watteyne provoked the most ardent enthusiasm by his reference to his "American family," this being his third visit to America. He appreciates the good will shown him, which is merely the reflex of his own generous spirit.

Speeches of appreciation followed from Beyling, Czalinski and O'Connor. They all spoke with approval of the work of the Pittsburgh Testing Station. Members of the Bureau and Geo. W. Davies, Secretary of the Mine Cave Commission, also spoke. In that informal close of the feast, no one created more interest than the venerable Watteyne.



SHOWING HOW THE BUREAU OF MINES HAS EXTENDED ITS EXPERIMENTAL MINE

THE EXPLOSION ON SEPT. 20

On Friday morning, another discussion took place and in the afternoon the conferring scientists and several visitors went to Bruceton for the *grand finale*—an explosion of the experimental mine. To assure success not only was a cased hole placed and charged, as in the Wednesday experiment, but an equal charge of 2¼ lb. was placed in a cannon set obliquely in the crosscut so that when fired the gases almost grazed the outby edge of that airway. As the two shots were fired together, the chance of expansion toward the crosscut was shut off.

In order to make doubly sure that the dust would not become unduly moistened, the amount used was doubled to two pounds per foot run of heading. In all 3000 lb. were used, 2500 lb. in the main entry, 100 lb. in the last cross cut, 200 lb. in the right butt heading and 200 lb. outby of the Taffanel barrier in the airway.

The stone-dust barrier was like that described in relating the preparations for Wednesday's experiment but there were only 10 boards used, sprinkled with stone dust and set at 4 ft. centers. In several places there was water in the heading but nevertheless the explosion took place.

Much of the distributed fuel could not have been effective because half was placed on the shelves and half on the floor. The latter half doubtless, even if not really wetted by the damp places on which it fell, was so close to water that it could not be much aid in extending the explosion.

THE SHOT WAS FIRED INTO STILL AIR

The fan was circulating 4000 cu.ft. of air per min. till just before the explosion but before touching off the shots, the fan was shut down so that the flame passed out into still air.

The explosion was quite violent. The flame traveling low passed at least 100 ft. out beyond the main portal. The unweighted plates were thrown off the oblique gallery. A large body of partly burned dust blew out of the mine and an empty car standing on a track outside the mine and 20 ft. from the main portal hurtled through the air across the ravine to the neighboring hill and stopped in fragmentary condition, 200 or 300 ft. from its original location.

It has been reported that the blast was as severe as that at the National First Aid Demonstration. The car was thrown as far but as it was empty, this is no indication. The inside of the mine was not severely injured and the force was largely confined to the main entry.

THE TAFFANEL BARRIER NOT REALLY TESTED

In the "airway" the flame extended an extremely short distance. The gun cotton 25 ft. outby of the last crosscut and located immediately over the Taffanel barrier, was not consumed. It is probable that the flame was not well started at that point. So it can hardly be held that the Taffanel barrier proved its value; in fact the Bureau will not test the matter thoroughly till M. J. Taffanel arrives, when tests of his system in stopping fully established explosions will be made.

Hauling Capacity of Electric Locomotives

BY BENEDICT SHUBART*

The controversy regarding the respective merits of two-motor locomotives as compared with single-motor locomotives will probably always be with us. The adherents of the two-motor design will maintain that by reason of the presence of two-motor units, in case of a burnout in one unit the locomotive will always be able to give partial service. Against this the adherents of the single-motor design claim the lessened danger of burnouts due to the much more massive design of the single motor, while they claim a much greater hauling capacity per unit of weight of locomotive.

The following analysis of the reason for the added hauling capacity of a single-motor locomotive will be interesting. It is assumed in the case of the two-motor locomotive that the usual design of two separate motors each coupled to its separate axis is used. Where the two axles are connected together by connecting rods as is done in some designs, then the locomotive may be considered essentially as a single-motor locomotive as regards its hauling capacity.

ANALYSIS OF THE PROBLEM

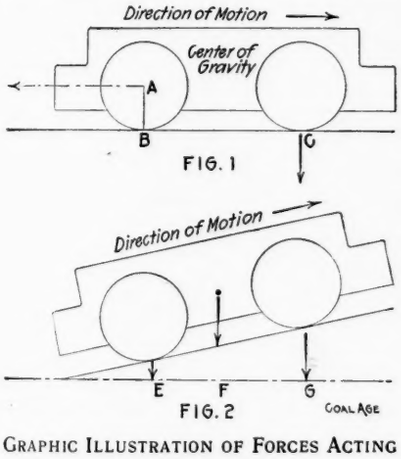
Let diagram No. 1 represent a ten-ton locomotive with a 48-in. wheel base with the draw-bar placed 12 in. above the rail. Assume that the locomotive is developing a draw-bar pull of 25% of the total weight on the drivers or 5000 lb. pull. The motor capacity is assumed to be sufficient to slip the drivers under any conditions, as this is a usual condition for mining locomotives. It is plain that there are two sets of forces acting on the locomotive; firstly, the draw-bar pull which tends to rotate the entire locomotive about point "B" with a lever arm "AB" and a pull of 5000 lb.

The force resisting this is the weight of the locomotive operating about point "B" as a pivot and tending to hold the

*Boston Building, Denver, Colo.

second set of drivers to the track at point "C." The force tending to hold the front drivers to the track is equal to the weight of the locomotive multiplied by one-half the wheel base, equivalent to a force of 20,000 lb., acting at a lever arm two feet long. The force tending to raise this driver from the ground is that of a force of 5000 lb., acting with a lever arm "AB" equal to one foot and is equal to the draw-bar pull multiplied by the lever arm "AB" or a pull of 5000 lb., exerted on a one-foot lever.

The result of the action of the draw-bar pull is to reduce the effective weight on the front truck and to add to the weight on the rear wheels. Under the above conditions the amount of this reduction and addition is one-eighth of the amount of weight normally on each truck when standing still, or in other words the weight on the front truck will be reduced 1250 lb., and the weight on the rear truck will be increased 1250 lb.



GRAPHIC ILLUSTRATION OF FORCES ACTING ON LOCOMOTIVE

REASON FOR DECREASED TRACTIVE FORCE

Now it is plain that the total weight on the two drivers is still the same, 20,000 lb. But the reason for the decreased tractive force of the two-motor locomotive is found in the fact that under the above conditions the front drivers will slip by reason of the lessened weight on them long before the rear drivers will slide. It is also plain that the effective weight on the front drivers is less than one-half the weight of the locomotive, so that the front drivers cannot exert a tractive effect such as would be expected.

As the friction of sliding is materially lower than the friction of rest, when the front drivers start slipping their tractive power is materially reduced and while it is a matter of experiment as to the exact amount of this reduction in tractive effort, yet it is perfectly plain that the burden of haulage will be largely thrown on the rear drivers, which under the above conditions, carry only nine-sixteenths of the total weight of this locomotive.

With the single motor locomotive with all wheels coupled to the one motor, or with a two-motor locomotive with side-rod couplings, the front set of drivers cannot slip independently and thus will develop the full friction to be derived from a weight of seven-sixteenths of that of the locomotive, while at the same time the rear truck will develop the full friction to be derived from a weight of nine-sixteenths of the locomotive, or in other words the single-motor locomotive will at all times develop the maximum amount of friction or draw-bar pull available from a given weight of locomotive, which condition cannot be obtained from the above analysis by a two-motor locomotive, with each truck operating independently.

CONCLUSION

A similar analysis may be made of the two different types of locomotives when hauling up-grade. Sketch No. 2 shows plainly that there is a still further loss of tractive power from the front truck on the two-motor locomotive, as the ratio of weight on the two sets of drivers is the ratio of "EF" to "FG."

An interesting conclusion derived from the above is that the height of the draw-bar and the wheel base of the locomotive in two-motor locomotives have a very marked effect on the hauling capacity. The net conclusions are that the draw-bar of a two-motor locomotive should be placed low and the wheel base should be made as long as practical, though a variance of these dimensions within reasonable limits has no effect on the hauling capacity of a single-motor locomotive.

Market Conditions in the Middle West

The secretary of the Coal Operators Association of the 5th and 9th districts of Illinois has issued the following bulletin to members under date of Aug. 31:

It may be of interest to know that for some time past and at the present time coal is being sold at about the following prices per ton:

2-in. lump coal (66⅔% of production)	$0.85
2-in. screenings (33⅓% of production)	0.40

This nets about 70c. per ton mine-run, f.o.b. mines. It may be possible for some operators to produce coal at these figures, but in the writer's judgment the following would be about an average cost per ton:

	Cents
Picked mine coal	61
Yardage per ton (approximately)	3.5
Shot firing, per ton	1.5
Labor, consisting of drivers, trappers, track layers, timbermen, slate hustlers, gobbers, cagers, mine examiner, mine manager and assistant, mule feeder, engineers, firemen, weighmen, topmen, car trimmer, yardman, dock boss and clerk	20
Total	86.0

The above only covers items contained in the pay-roll cost, and the writer feels that in some instances lower rates can be shown, while in other cases the same will be found higher. Therefore, on this basis the pay-roll cost is 16c. more than the price for which the coal is being sold. With a tonnage of 500 tons per day this would mean a loss of $80 per day. It is self-evident that this is not business, and the operators must join the ranks of those that desire to get cost of production, and permit healthy and sane competition.

In addition to the above pay-roll cost there are the following items: Interest on capital invested, cost of selling and administration, depreciation, royalty, supplies, boiler fuel, fire and tornado insurance. These will amount to 5c. per ton, and the compensation law adds approximately 5c. more, making a fair average of 96c. per ton for mine-run coal.

These figures indicate astounding conditions existing in this field, and from a comparison show more cause for alarm at the present time, than ever before existed. Unless some means are devised to change this condition, it will spell complete ruin and bankruptcy, which will be severely felt by the consumers, bankers, miners and merchants in the community.

All of the coal trade papers are attempting to picture to the operators this condition through their able editorials and point out the danger of a severe car shortage; also the shortage of coal at the docks in the Northwest, which we have every reason to believe to be true. In the face of these conditions why should any operator give away his product for less than actual cost? Let us hope that operators will study their cost of production and issue such orders to their selling agents that will secure for them cost of production or leave the coal in the ground and thereby at least benefit conservation.

British Facilities for Shipping Coal

New coaling staiths (the provincial English name for the extremity of a line of rails laid on a platform for discharging coal, etc., into vessels) have recently been erected at the south dock at Seaham Harbor, on the northeast coast of England, in order to provide facilities for the greatly increased coal-shipping traffic.

The staiths are 720 ft. long, and consist of two gantries 27 ft. wide, each carrying two lines of rails. The gantry nearest the dock is used for the loaded cars, which travel over a skew-lattice girder span 84 ft. long, and then over a skew-plate girder span 59 ft. long. Thence the roads are supported on steel trestles varying in height from 36 ft. to 51 ft. 7 in. from ground to rail level.

The rails are spiked to 10x10-in. cross sleepers of pitch pine, which are bolted to the steel joist stringers resting on the crowns of the trestles. To these sleepers also are spiked the 3-in. pitch-pine planks forming the deck. The cars gravitate to four coal spouts and the coal is delivered by means of chutes into the ship's hold. The whole of the work was carried out at a cost of about $110,000.

The Consolidation Company in Kentucky

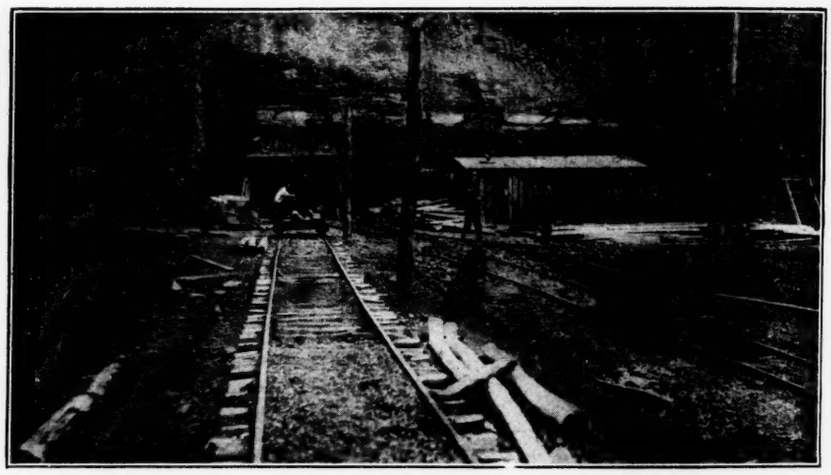
In this issue we publish a number of excellent halftones of the Consolidation Coal Co.'s operations in Kentucky. The Consolidation Co. is one of the largest, if not the largest bituminous-coal company in the world, and their methods of development are naturally of more than passing interest.

The town of Jenkins, shown in one of the accompanying photos, is located at the foot of the Pine Mountain in Letcher County, Ky. It is on the Sandy Valley and Elkhorn R.R., 28 miles from Shelby Junction where the road leaves the Big Sandy division of the Chesapeake & Ohio Ry. The junction point with the latter is at Ashland, a station about 750 miles west of New York and 130 miles east of Cincinnati.

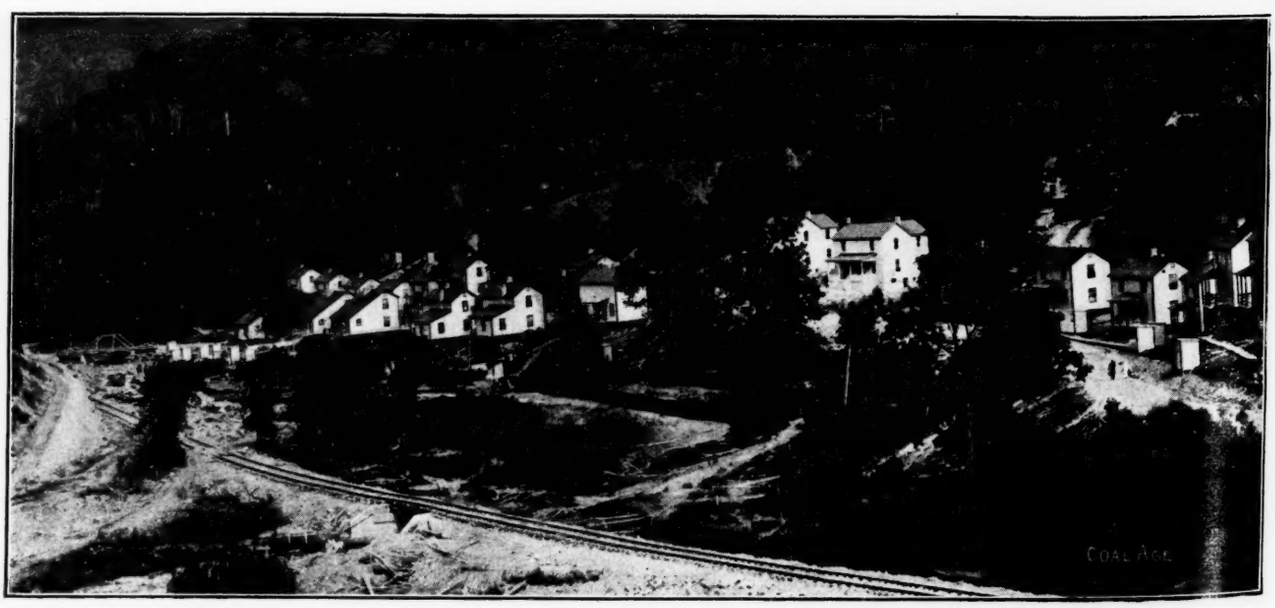
The Elkhorn seam in this district varies from 7 to 10 ft. thick, usually, but is quite often 12 or 13 ft. in thickness. In the accompanying illustration the coal is shown exposed for the drift opening at No. 203 mine; at this point the seam is 8 ft. thick. The seam has one irregular parting which varies from nothing to 10 or 12 in. in thickness and occurs at from 2 to 5 ft. above the floor. A special machine is used which mines in this parting. The shale is soft and easily separated from the coal, thus effecting a clean product.

All the openings in the Elkhorn field are drift mines. At No. 201 mine the seam lies about 150 ft. above water level, while at Nos. 207 and 208 the drift mouths are at water level. Only temporary fans have so far been installed, but large electrically driven ventilators of ample capacity will shortly be put in.

THE VILLAGE ATTACHED TO MINE 201

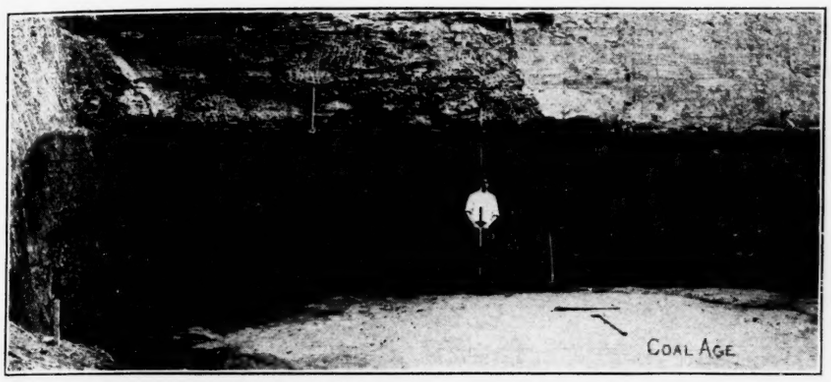


DRIFT MOUTH OF MINE 203

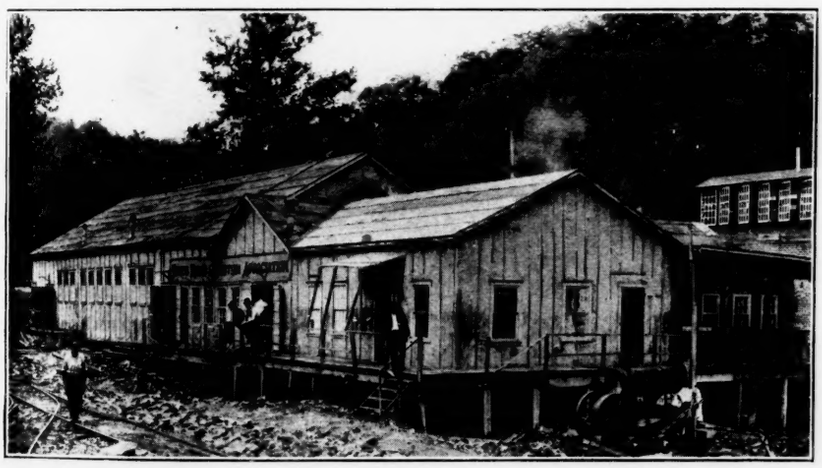


THE HOUSES AT MINE NO. 203 ARE SCATTERED ALONG THE COUNTRY ROAD

DAM PROVIDING WATER FOR DOMESTIC USE



SHOWING COAL SEAM WHICH IS BEING DEVELOPED



TEMPORARY BUILDING OF YOUNG MEN'S CHRISTIAN ASSOCIATION

LIVING CONDITIONS

The miners' houses at Jenkins are probably above the general average of such. They are constructed on various styles, consisting of three, four, five and six rooms. They are all plastered inside, and have fire places or flues for stoves in each room with ample closet and pantry space; each house has a front and back porch. The town is built at the foot of Pine Mountains, down which are numerous streams of pure water.

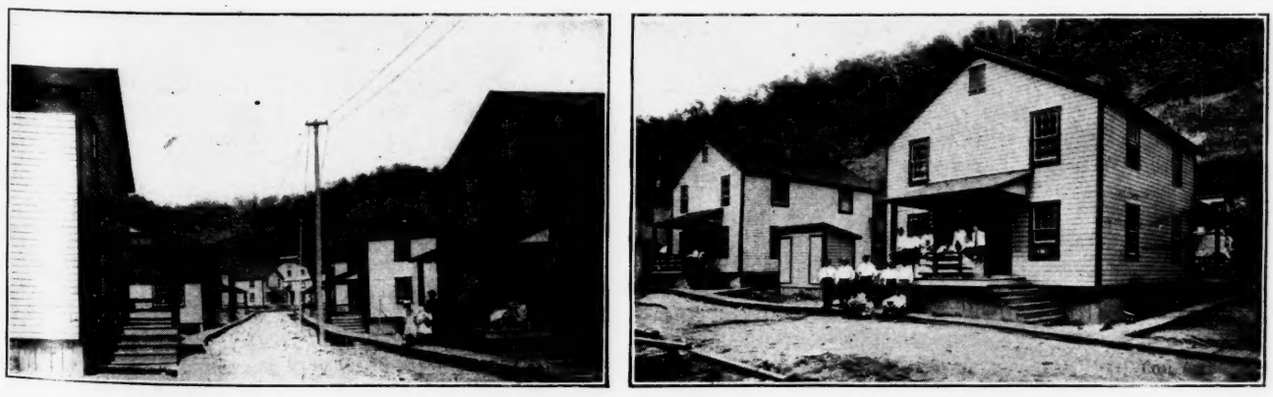
Strict sanitation rules are in force. No hogs are permitted to be kept around the houses, garbage is collected each week and everything possible is done to keep the health of the community up to the maximum. In general, large sums of money have been expended in making streets, building sidewalks and other improvements.

In the accompanying illustrations is shown the temporary Y. M. C. A. provided for the amusement of the residents. A large auditorium seating 500 people is used for entertainments of all kinds. Moving-picture shows are run regularly during the week, and on Sunday church services are held both morning and evening. Two bowling alleys and four pool tables are in constant use, and there is also a news stand, soda fountain, barber shop and showerbaths.

One of the accompanying halftones shows a ten-room double house with a large front and back porch. The houses of this kind rent for $7.50 per month for five rooms, including electric lights. All houses are built on lots, allowing ample room for a garden if desired.

The reservoir, shown in the accompanying halftone, is located in Pine Mountain above all habitations, and hence is absolutely free from any pollution. This is the source of supply for Jenkins.

On the front cover of this issue is shown a flashlight taken in mine No. 204. The height of the seam is easily seen, and no props or timbers are used on any entry. All entries are driven on sightes with clearance on the brake side of the car and every precaution taken to insure the safety of the miners.



SCENES IN JENKINS, KY. THE STREET ON THE LEFT IS BEING MACADAMIZED WITH BROKEN ROCK

Current Coal Literature

The Best Thought Culled from Contemporary Technical Journals, Domestic and Foreign

Special Cars for Miners

The late W. H. Pickering, who lost his life at the explosion of the Cadeby Main mine in Yorkshire, gives the following description of two special cars, arranged to carry men into the faces of the workings. The clipping quoted is from his recent report on the Yorkshire and North Midland District:

"The workings of some of the older mines are at great distances from the shafts, and it is not uncommon for a miner to have to travel 1½ miles before he reaches his working place. There are even cases where the distance is over 2 miles. For the double journey, amounting to 3 or 4 miles, an average man may take from 1 to 1½ hours.

"If the road is rough, steep, or otherwise difficult to travel, he will expend at least as much energy as if he had been working at the face for the same length of time, and this energy is entirely unproductive. To avoid this loss it has been the custom for generations at many mines, where the main-and-tail rope system of haulage is installed, to convey the men to and from their work in trains of empty cars.

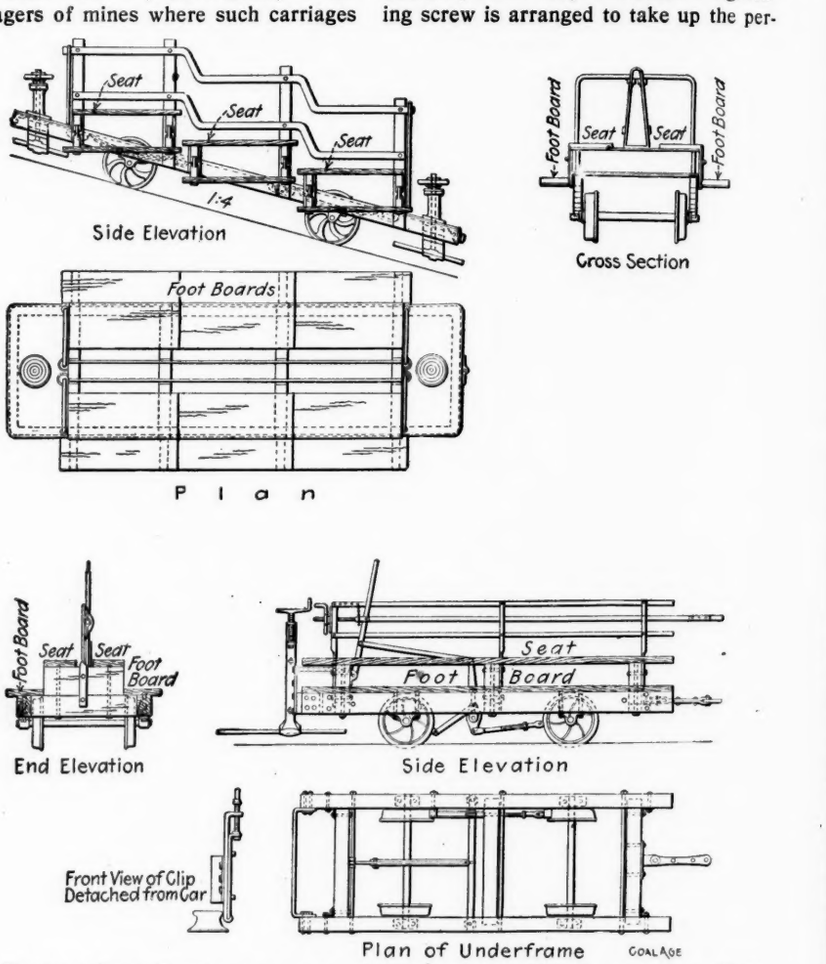
Difficulties Where Endless-rope Systems are Used

"In the Yorkshire and North Midland districts, however, the endless-rope system of haulage is almost universal. In most cases it is impracticable to use this system for the conveyance of men as well as coal. The Eight Hours Act, which limits the time a man may be underground, has made it more important than ever, both to the miner and the manager, that time and energy should not be dissipated on unproductive work.

"It would probably pay the management of many mines to install a light-haulage system designed for the sole purpose of conveying the men to and from their work. The power required would be small and at least while making the first journey in the morning, would only be used when coal was not being hauled.

"A considerable outlay of capital would be necessary for engines, ropes, rails, and for adapting the existing roads for purposes of haulage, or in the driving of new gangways. This would be recouped by the conservation of the men's time and energy, and the greater facility by which the airways would be kept in order after the haulage system was established.

"If such an arrangement were made it would be well for the management, in the interests of safety and comfort, to provide special carriages instead of ordinary mine cars. By the courtesy of the managers of mines where such carriages are already used, I have been able to give the accompanying sketches, and the following description of the arrangements at two mines:



Two English Cars Designed for the Conveyance of Miners from the Foot of the Shaft to the Coal Face

First Mine

"The haulage engine, used solely for the purpose of conveying men, has two cylinders, 18-in. stroke, 12 in. diameter, worked by compressed air, the pressure being between 50 lb. and 60 lb. per sq.in. The rope is endless, ¾ in. in diameter, but only one set of rails is used. The loaded rope runs between the rails, and the return idle rope is carried along, or suspended from the side of the road.

"The engine is reversible. Two tension arrangements are provided, one on each side of the driving pulley, and, in addition, at the inbye terminus a tightening screw is arranged to take up the permanent slack. The haulage is 7400 ft. long, with four sharp curves and a number which are easier.

"The maximum speed of the rope is 8 miles per hour, and the average hourly travel, including stoppages, is from 5 to 6 miles. The road dips continuously from the shaft at an average gradient of 1 in 31, the steepest part being 1 in 20. The three bare-wire electric-signalling arrangement is in use, with a bell at each terminus.

"Two persons are in charge of every train, one at each end, and they are each

provided with an arrangement by which they can give signals while the train is running. Going inbye, the front man takes charge of the clip, and the back man manipulates the brake on the varying gradients, so that the clip always exercises a slight pull.

"Going outbye, the brakes are not necessary and the rear man watches the pulleys to see that the ropes are left right for the next train. Each carriage carries six men on a side, sitting back to back. Six carriages are coupled together to form a train, and six trains form a 'run.'

"The total accommodation on one run is 432 men, or making allowance for the size of boys 450 persons. But for the outbye journey only three trains are allowed. The ropes run for three-quarters of an hour at the beginning and termination of the shift. Each train starts directly it is full.

"The rope is stopped to attach and detach the trains, and the signal then given indicates that another train may be clipped on if ready. On an average, trains are attached every six minutes and the journey is made in about a quarter of an hour, allowing for three stops. There is a clip at each end of the train, but on account of the curves only one clip can be used at a time.

"Each carriage is fitted with a brake acting upon both sets of wheels, and controlled by a vertical lever which can be pegged in any position. All these brakes are connected by a continuous brake rod, by means of which they can all be applied from any carriage in the train.

"The front end of this connecting rod is passed through a standard, and the screwed end is fitted with a threaded handle by which the rod can be drawn tight so as to put extra pressure upon the brakes. Rapid movement is obtained by the lever and the final tightening by the screw.

"The couplings are rigid and strong, but if one should break, the separation of the cars would cause the brake rod to set the brakes firmly upon the detached portion, and so give instant warning. If the brake rod failed, the detached portion could easily be pulled up by the levers.

"Owing to the rigid nature of the clips, the pulleys are set at all curves with their faces 1½ in. out of the center of the road and toward the inner rail so that the clip may pass them without fouling. For the same reason the height of the rope has to be nicely adjusted at the curves to the height of the clip jaws.*

Second Mine

"The coal worked at this colliery outcrops with a steep gradient. The workings are reached by straight inclines driven to the full dip. One incline is a return and is fitted with haulage for conveying the men to and from their work. The average gradient of the road is a little over one in four, the maximum being one in three.

"The length of the portion used for riding is 3000 ft. It is divided into two stages, with a space of 25 yd. between. A single set of rails and an endless rope of ¾ in. diameter is used. In order to balance the weight of the cable, it is crossed at the half-way point. Thus the rope which was loaded in the top section becomes idle in the lower section and *vice versa.*

"Two trains are in use, one on each part of the rope, and thus they always travel in opposite directions. One starts from the top as the other starts from the bottom and they finish at the center and within 30 yards of each other. Time is allowed for the men to change cars, the motor is reversed and the journey continued.

"The 75-hp. driving motor at the top of the incline is reversible. It is provided with an indicator to show the position of the train. The rope drum is fitted with a footbrake of the band type, embracing two-thirds of the circumference, and with a clutch to enable a steady start to be made. Tension is applied to the rope at the lower end by means of a small dead weight which acts upon the return wheel mounted upon a bogey.

"The riding carriages are mounted on springs and are constructed of iron and steel, with wooden seats and footboards. Twelve men ride in each carriage, six on each side. Six carriages make a train, and thus 72 men can ride at a time. A similar number of men may also ride in the opposite direction at the same time. A man is in charge of each train.

"He fixes a drag for the upward journey. Electric signals are used, the bells being at the center and at the ends of the train. The speed of the haulage is about 4 miles an hour, and it effects a considerable saving of time and exertion on the steep gradient. No accident has occurred in connection with this system."

*One fatal acident happened on Sept. 14, 1906, in connection with these cars.

Will Personal Liability Reduce Accidents?

The following editorial we publish from the *Pittsburgh Leader.* It embodies the ideas of those who favor drastic employers' liability laws. Such laws may not in the end effect their purpose owing to the bankrupting of the smaller companies. They may only result in the technical dissolution of larger corporations to avoid the overwhelming effects of liability.

The editorial passes over without consideration the essential fact that injuries are more often the result of personal than of corporate carelessness.

"The agitation for a mine commission to make safe, or at least safer, the bituminous mines of the United States, is well enough so far as it goes, but it is swallowed up in the effort to establish employers' liability laws.

"If safety of the mines is to be secured, increased liability of the employer is the way to effect it. Let the mines be made not merely safer than at present, but actually safe.

"Legislation which depends for its force upon the designation of various devices and restrictions is merely a makeshift. It may help, but the records of experience illustrate that owners of industrial plants become interested in devising means to evade these restrictions.

"When the employer is held directly liable for the safety of his plant, security will be supplied without loss of time, or attempt at quibbling, or efforts to defeat the law. The nerve of the pocketbook has long been recognized as the most sensitive of all. It is the nerve which must be touched if mines and other industrial establishments are ever to be made safe.

"When employers understand that they may have their plants in whatever shape they choose but that they will be held responsible without defense for the injury of employees, we shall have such a swift and widespread improvement of appliances that the world will be surprised. Instead of trying to force the employer to apply some makeshift remedy, he should be required to furnish the safety to wage workers or pay all the costs of the failure.

"Mines and all other industrial establishments must be made safe for wage workers and the way to make them safe and to do it in the shortest possible time, and in the most effective manner, is to make the employers liable for the safety of employees.

"When employers' liability laws are in universal use, employers will see to it that there will be a greater degree of safety than could be brought about in any other way. Mines and all other industrial establishments will be made so safe that the world will wonder why we blundered along incompetently for so many years.

"The only effective way to make mines and all other industrial places safe is to let the question of the safety reside in the pocketbook nerve of the employer. Then he will make safety fall under the same economic regulation to which all other conditions are subjected, because it will be a matter of profit to himself.

"Make safety a matter of profit to the employer, and there will be a safety that will astonish the world. There is no other sure way, therefore let us have the employers' liability law."

Who's Who—in Coal Mining

Devoted to Brief Sketches of Prominent Men, Their Work and Ideas

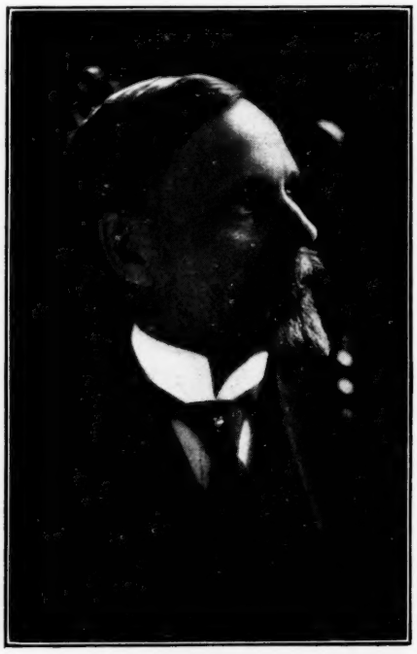
There are times when the editor's task is most unpleasant. Nothing grieves us more than to travel counter to the wishes of those we had only hoped to serve. So when we are forced to choose between the fulfillment of duty, as outlined by a definite plan of work, and personal preference, there is no option left us.

For months past, on this page, we have printed a brief sketch of the life and work of prominent coal-mining men. The wisdom of this plan has been proved time and again, and everyone familiar with our work, and having the best interests of the industry at heart, must concede the benefits derived from a closer acquaintanceship, aside from the inspiration younger men obtain in reading the biographies of those who have climbed to success in their chosen vocation.

We have not pursued our present course without first having consulted the wishes of our readers in every field, and until we perceive a change in sentiment and find that "Who's Who" stories are no longer desired, the present plan of printing a sketch each week will be followed. Under no circumstances will we exercise our editorial prerogative by stooping to a policy of personal requital. Those who are not friendly to us, or who differ with us in our definite course of action, are as safe from retaliatory criticism as the boss who hires us.

There is no doubt but that some men hold the view that their personal lives and individual conduct are matters so private as to be free from public gaze. Such an opinion is certainly justified so far as the home life of each man is concerned, and we can conceive no greater impertinence than an undesired and uninvited inquiry into one's domestic life, which is not public in character or nature. However, in the conduct of any business which is wholly dependent on public patronage, and which is an integral part of an immense industry, the situation is entirely changed. Present-day thought demands just as strict an accounting from a man engaged in the administration of a private business as a fellow directly engaged in public service.

When it is discovered that a company is wasting any natural resource, is it the purpose of our government to stand idly by and permit the unnecessary losses just because the property belongs to one or more individuals? Some people, years ago, may have thought there were no limits to the rights of private property, but if their viewpoint has not been changed before this, then they are surely wearing ancient ideas in a modern age.



C. C. Rose

All of the foregoing has nothing to do with our sketch of C. C. Rose, other than to explain why we persist in running a story about the man who is averse to this sort of public notice. Mr. Rose loves the spot-light about as much as one of his miners loves a pocket of fire-damp. To drag him into the full glare of public gaze is quite as difficult as it is to pull some other men from under the lime-light.

He is the type of man who likes best to go about his work in his own peculiar way, getting what results he can and keeping his success bottled for those directly interested in his services. In his position as general manager of the coal department of the Delaware & Hudson Co. he has attained to a place of eminence in the anthracite industry.

Mr. Rose was born in Ellenville, a little town up near Kingston, N. Y. It was here that his early education was obtained. During the days of the old canal system he became connected with the D. & H. Co. and has never had occasion to regret the choice made. At an early age he left Ellenville and went down to Port Jervis, N. Y., and for fifteen years was engaged in various duties connected with canal work. Much Delaware & Hudson coal was carried through the old waterway, and when he was placed in charge of the shipping, Mr. Rose made many changes, which were so successful in their outcome that the way was paved for his future success.

From Port Jervis he went to the Lake Champlain region, where the D. & H. Co. placed him in charge of its coal shipments in that territory. His success in this new position was just as pronounced as it had been at Port Jervis, and his employers marked Mr. Rose for future advancement to more important work.

He is not a college man, but has secured for himself a broad education from private study, which, coupled with his years of practical business experience, has rounded him into a man superior in the matter of general education to many of those who boast a college degree. His real opportunity came when he was placed in the engineering department of the D. & H. Co., and it was in this line of work that his ability was most noticeable.

His precision and an unusual talent for mastering details were the two elements in his makeup which were chiefly responsible for a rapid advance through the minor positions on the company's engineering corps. When the D. L. & W. R.R. Co. was badly in need of a division engineer, its attention was called to C. C. Rose, and the offer made him was sufficiently attractive to wean him away from his first love. The Lackawanna people retained his services only a few years, when the Delaware & Hudson Co. came to realize that it had permitted one of its self-made and much-needed men to depart from its employ. As a result he went back to the company which gave him his first start, and it looks as though he returned for good.

Sixteen years have elapsed since he took hold of the management end of the D. & H. mines, and the progress of this company is sufficient proof that the confidence and trust imposed in him were entirely justified. Under his charge he has an army of workmen, and among those who know him best he is recognized as a real boss—not one of the kind who is obliged to swear a "sulphur streak" to get work accomplished.

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This journal is interested solely in matters relating to the fuel industries, and is designed to be a medium for the free interchange of ideas, the detailed description of coal-mining practice, and the expression of independent thought calculated to benefit both operator and miner.

Contents

Page

Foreword 417
Ideas and Suggestions:
Mining on the Day Wage Basis. G. M. Shoemaker 418
Efficient Mine Management. Samuel McMahon 418
Suggestions for New Superintendents 419
A New Era in the Purchase of Coal 419
Rescue Work in Mines..... 420
British Coal Cutting Machines. W. Bolton Shaw 421
The Testing Stations Conference. R. Dawson Hall 424
Hauling Capacity of Electric Locomotives 426
Market Conditions in the Middle West 427
The Consolidation Company in Kentucky 428
Current Coal Literature:
Special Cars for Miners..... 430
Will Personal Liability Reduce Accidents 431
Who's Who—In Coal Mining:
Sketch of C. C. Rose..... 432
Editorials:
The Coefficient of Friction..... 433
Air in Water Pipes..... 434
Rock Excavation in the Mines.... 434
Discussion by Readers:
Value of the Coefficient of Friction in Mine Ventilation 435
Illuminating Crosshairs 435
Inquiries of General Interest..... 436
Sociological Department:
Philadelphia & Reading Coal & Iron Co.'s Field Day..... 437
Meets in Northern Anthracite Field 439-440
Examination Questions and Answers 441
Coal and Coke News..... 442
Coal Trade Reviews..... 446

COAL AGE

The Coefficient of Friction

In another column of this issue we print an interesting discussion of the value of the so called coefficient of friction in mine ventilation, by Robert McCune. Mr. McCune draws attention to the great difference in the values given by different authorities for the coefficient of friction k.

Since this coefficient expresses the resistance of the mine or airway per square foot of rubbing surface, it is more properly called the unit of mine resistance or the *unit resistance*. It is clear that the mine resistance calculated from this coefficient or unit will vary in the same proportion as the value of the coefficient varies. For example, the resistance of a mine calculated by using the Atkinson coefficient ($k = 0.0000000217$) is practically seven times as great as that of the same mine, calculated by the coefficient preferred by our correspondent; namely, $k = 0.000000003$. Also, the *power* required to produce the circulation varies in the same proportion.

This wide difference in the calculation of so important a matter as the required power is perplexing to the practical man seeking reliable information that will enable him to estimate with a fair degree of accuracy the power that will be required to ventilate a certain proposed mine. The knowledge that the estimated power will vary from, say 50 to 350 hp., according to the coefficient used, is not calculated to inspire one with confidence in the calculation, whatever result is obtained.

However, there is not as much uncertainty in the calculation of ventilating power, as would appear from the foregoing remarks. Engineers who have taken many observations and compared results in different mines know that the resistance, or the ventilating pressure, or power, for any given velocity, cannot be accurately estimated from the rubbing surface of the mine or airway.

It is plainly evident that mine resistance is not *all* frictional resistance; because different mines present striking differences in the character of the airways. Some of these are straight, with comparatively smooth walls that offer small resistance to the flow of air through them; while others are tortuous or winding, and often heavily timbered; in others, the flow of air is obstructed by curtains, brattices, roof falls and many other things that act to increase the resistance.

It would be a practical impossibility to express in a formula, or to calculate the resisting effect of all these obstructions, and for this reason their combined effect is assumed to be more or less approximately expressed by the unit resistance, based on 1 sq.ft. of rubbing surface. In adopting this basis it has been assumed, rather too broadly, that obstructions of all kinds increase in number and effect in proportion to the size of the mine, which the rubbing surface is taken to represent most nearly.

A little reflection shows that the unit resistance only represents certain types of mines, as determined by such conditions as the amount of timber, curtains and other obstructions in the airways; the alignment and number of bends in the air courses; the inclination and thickness of the seam, etc. Attention has been called to this fact in textbooks on the ventilation of mines. It is not strange, therefore, that different observers obtain different results or values for the coefficient k.

In all ventilating tests, it must be remembered that it is extremely difficult and, in some cases, well nigh impossible, to eliminate or account for all the influences that operate in mines to affect the results. The effect of natural air columns is, perhaps, the most commonly overlooked, because unsuspected. The difference in the results of carefully conducted experiments, in mines of the same type and under practically the same conditions, is of itself evidence of the failure on the part of investigators to fully account for all the influences operating to affect the results.

While it is readily admitted that the Atkinson coefficient, abbreviated as we have suggested some years since, namely,

$k = 0.00000002$, is high; or, at least, represents a type of mine or airway presenting the greatest possible resistance, it is, nevertheless safe to take the Atkinson value, which will be sufficiently large to cover any possible conditions that may arise. We would not vouch for or recommend the use of a smaller coefficient unless the user is willing to assume the responsibility for its correctness, in the particular case considered. It is always safest and best, in estimating power, to provide for the worst conditions that may arise.

Air in Water Pipes

The gurgling of water in a pipe is due to the presence of air bubbles, and if we desire to operate the full bore, these accumulations of air should be driven out. Especially is this true if we are siphoning water. The unthinking man reasons that a bubble of air signifies a high place in the line. He reasons that the water rises toward the highest points in the pipe and shuts in the air.

Many bubbles come from that cause, but quite usually a small bubble attaches itself to some roughness and gathers accretions from infinitesimal air particles loosely held by passing water. In fact, as has often been noticed, bubbles will form on the bottom of a glass tumbler if the water it contains is super-saturated.

In an engineer's level, the rounding of the tube is small and the air would, if it were not for surface tension, spread in a thin layer over the top of the alcohol. But by virtue of the tension existing between the air and alcohol, the bubble depresses the liquid at its center and raises it at its ends.

In like manner in a pipe, a little roughness may hold against the motion of the water a far larger bubble than could secrete itself in the pitting, unevenness at screw threads or other roughness of the pipe. A part of the bubble being firmly held, the remainder of it, though exposed to the current, is not easily dislodged, and where the pipe is used as a siphon, the bubble still in place will enlarge to two or three times its former size, owing merely to decreased pressure. Moreover, it will grow in size by contributions of air from passing water.

The best way to remove such bubbles is to rap on the pipe smartly with a hammer. The jar will dislodge the air which will be swept away by the passing current. Good results have been obtained by rapping the pipe when operating siphons which had heavy lifts. The bubbles in this case were removed while priming.

A careful consideration of the foregoing will explain why "filling" the two legs of a siphon and removing the air collecting at the summit often fails to make the pipe lift water continuously. The little blebs of air escaping to the pipe summit from one end to the other of the rising columns cause a back pressure, which prevents efficient operation, and the margin of power in a siphon is so small where the lift is high, that the passage of air soon stops it altogether.

It must be remembered that the pressure on the air at the foot of the rising column during priming is equal to the atmospheric pressure, *plus* the weight of the equivalent vertical water column. If after the siphon is started that bubble is dislodged and travels to the "vacuum," so called, its pressure is the atmospheric pressure, *minus* the weight of the equivalent water column.

In the first case, the pressure may be 24 lb. per sq.in., and in the second about 4.8. So bubbles passing the full length of the rising leg will increase in volume fivefold. Thus, the rapping of the line during priming, especially near the influent point, is absolutely essential if good results are to be obtained. A siphon when working well should not gurgle like a brook. Yet too often the gurgling has been taken as a sign that the siphon was running satisfactorily.

Rock Excavation in the Mines

There are some features in piecework against which the operator has always to guard. None is more dangerous than the view that having agreed with an employee to do so much work for so much pay, the superintendent has no more interest than to see that such jobs are done with safety and celerity.

There is little question but what in some mines persistent attempts have been made to keep the yardage in headings down to a small figure so that no readjustment of rates may be attempted. By running one or more headings with day labor, and employing men of ability and energy, a test could occasionally be made of what could be done by miners who were willing to do a full day's work.

But in no place is such a test more necessary than in mines where there are possibilities of introducing machinery for drilling rock. In fact with machine drills it should be possible to drive headings at much lower prices than those which now rule and to make at the same time increased headway. For where the heading rate is high, we usually find the rate of progress is proportionately low.

In many mines, however, without deviating from the piece rate, the introduction of drills for bottom and top rock would be justified. Often it is impossible to induce the heading driver to shoot hard limerock bottom or particularly hard nigger-head top or to take up a light lift of rock which latter he declares it will not pay to drill.

In many other cases also, by long prescription, headings have been made too narrow or have been driven with ill-squared corners. Under all these circumstances, with the proffer of the use of a machine as a sweetener, the heading driver may be induced to modify a condition which long usage has by indifference elevated almost to the dignity of a working agreement.

It is well known that many headings driven, part in rock and part in coal, conform with the law as far as the coal is concerned, but are far from the legal requirements in the roof and floor. Such ill-shaped headings add considerably to the risk of driving mules or handling the cars of motor trips. Too often the miner has sought to evade his responsibility to his fellow-man and driven headings of inadequate dimensions regardless of consequences, leaving to the corporation the duty of settling with the relicts of those persons who may be killed by passing cars.

But the use of air drills is peculiarly adapted to road grading and ditching. In these, the material to be removed is not usually fire-clay or shale, but a rock much harder to drill. The amount of excavation attempted is frequently limited by the possibilities of one night's operations for the road must be put in condition for the next day's run. The regrading is usually done, not when work is slack but when it is at fever-heat, and it is then impossible even with the help of Sunday to get more than three day-long shifts consecutively.

Discussion by Readers

Comment, Criticism and Debate upon Previous Articles, and Letters from Practical Men

Value of the Coefficient of Friction in Mine Ventilation

In one of the examination questions answered in COAL AGE, Aug. 17, 1912, p. 233, it is calculated that a water gage of 23 in. will be required to pass 50,000 cu.ft. of air per minute through an airway 5 by 10 ft., 10,000 ft. long, in a single current. After answering the question, the statement is made that "it would be practically impossible to maintain a velocity of 1000 ft. per minute in an airway of this size, 10,000 ft. long."

It seems to me that the excessive pressure found in this calculation is due chiefly to the value of the coefficient of friction used, which is the old Atkinson coefficient slightly modified. Mr. Atkinson, in his "General Principles of Ventilation," gives $k = 0.0000000217$, which has been abbreviated to $k = 0.00000002$, for simplicity and ease of calculation. Other and later writers give different values for k. Two French mining engineers, Elwen and Devillez, give 0.00000001 for rooms and 0.000000005 for shafts and main slopes. T. A. Southern gives 0.000000002 for shafts and 0.000000003 for airways. H. K. Jordan gives the same value as Southern for shafts. Both Southern and Jordan base their values on actual experiments in mines.

Many students use the simple value $k = 0.00000001$, because it is easy to calculate, although they probably know that it is too high a value. I believe the value given by Southern ($k = 0.000000003$) is the best for airways. If, in the example to which I have referred, this coefficient is used, the water gage required to pass 50,000 cu.ft. of air per min., in the given airway, will be found to be only 3.4 in., instead of 23 in. This is not a very high pressure, and is what we might expect in practice.

Any student who has access to the water gage and anemometer readings of the mine where he works, and is able to calculate approximately the rubbing surface can compute the value of the coefficient of friction for that mine, by means of the formula

$$k = \frac{pa}{sv^2}$$

The number of decimal places in the coefficient is apt to stagger one who is not good in arithmetic. For this reason, some writers estimate the volume of air passing in thousands of cubic feet per minute, or the velocity of the current in thousands of feet per minute, as the case may be, which reduces the decimal by six places. For example, the velocity, in this case, being 1000 ft. per min., rubbing surface 10,000 × 30 = 300,000 sq.ft. and the sectional area 50 sq.ft., the required water gage is, using the Southern coefficient, as I have suggested,

$$w.g. = \frac{0.003 \times 300{,}000 \times 1^2}{50 \times 5.2} = 3.4\ in.$$

In this case, the coefficient 0.003 is the resistance in pounds per square foot of rubbing surface, for a velocity of 1000 ft. per min. In using this coefficient, it is necessary to divide the given velocity by 1000. For example, if the velocity is 700 ft. per min, 700 ÷ 1000 = 0.7 ft.

In most mines, it is difficult, if not impossible, to calculate the extent of rubbing surface for the entire mine, with any degree of accuracy; and when the air is split one or more times, as is generally the case, the task is even more complicated. To test or ascertain the coefficient of friction, under these conditions, a simple method to adopt is to select a certain distance of the main road, say 3000, 4000 or 5000 ft. The water-gage reading taken on a brattice in the nearest crosscut, at this point, subtracted from the water-gage reading at the outby end of the measured distance will give the water gage or pressure absorbed in passing this volume of air through this length of roadway, including the corresponding length of return airway. It is hardly necessary to say that the portion of roadway selected should have an approximately uniform area of cross-section.

By following this method, one need not be surprised to find a value for the coefficient of friction that is much less than the Atkinson coefficient. I wish to say that I value the work of Mr. Atkinson very highly, as the data he has given have enabled us to work many problems in ventilation.

ROBERT MCCUNE.

Delagua, Colo.

Illuminating Crosshairs

Referring to the article of Geo. M. Brown, in regard to illuminating the crosshairs of a telescope, in mine surveying, COAL AGE, Sept. 14, p. 367, Mr. Brown states that he has found that "a small piece of tracing cloth held behind the plumb bob or string and illuminated from behind enables him to take a sight of 300 ft., and no illumination of the crosshairs is needed."

I first used this practice about three years ago, at the mines of the Rock Island Coal Mining Co., Hartshorne, Okla.; and we are using the same method, at the present time, in surveying the mines of the Consolidated Indiana Coal Co., Hymera, Ind. The method is an old European practice and is explained in some European textbooks on mine surveying.

V. SRAJN,
Hymera, Ind. Mining Engineer.

[A correspondent, who evidently has strong domestic proclivities, sends the following:—EDITOR.]

A SUGGESTION OF IMPROVEMENT

Referring to the illuminating of crosshairs in a surveying telescope, I would suggest the following improvement: Induce your wife to procure for you an embroidery ring. If you know how, insert a sheet of tracing cloth between the rings and clamp it, or get your wife to do this for you. It is as tight as a drumhead and you can see the crosshairs and plumb-bob string with no illumination other than a lamp held behind the screen.

H. J. MERWIN.

Knoxville, Tenn.

P. S.—If you have no wife, your best girl will get this for you. Ask her.

Spontaneous Combustion in Coal Mines

In seams liable to spontaneous combustion the method of working adopted should be some form of pillar and stall, longwall retreating, or the method known as the "panel system," though the latter is rare in this country. In all retreating systems the entries are driven to the boundary before the work of extraction is commenced. By this means, the gob containing small coal or other material likely to cause an outbreak of fire is left behind, and the waste is built up as tightly as possible to prevent air from penetrating the goaves.

The panel system consists in dividing the mine into panels or districts, separated by a coal barrier. Each panel is ventilated by a distinct current of air, and should a fire break out in one section, other sections will not be affected. In this system only two stoppings are required to entirely isolate the fire.

La Salle, Ill. MINE FOREMAN.

Inquiries of General Interest

All Questions Must be Accompanied by Name and Address—Not for Publication

Size of Engine, Tail Rope Haulage

What power and size of engine will be required to haul 20-car trips, in a mine, at a speed of ten miles per hour, except on grades against the loads where the speed will be reduced to five miles per hour, using steam at 60 lb. gage pressure? The extreme length of haul is 6500 ft.; the cars weigh 1400 lb. each and carry 2240 lb. of coal. All the grades are in favor of the loaded trip, except 400 ft. of 4-per cent. grade, followed by 100 ft. of a 15-per cent. grade; these two grades being against the loads. The system of haulage to be used is the tail-rope system, using a ¾- or a ⅞-in. rope. The engine is to be a duplex engine, geared 4 : 1, and the diameter of the winding drum is 5 ft.

SUPERINTENDENT.

Pittsburgh, Penn.

The weight of the loaded trip is 20 (1400 + 2240) = 72,800 lb. Using a ⅞-in. rope weighing 1.2 lb. per ft., the entire weight of the two ropes, the main and tail ropes, is $2 \times 6500 \times 1.2 =$ 15,600 lb. The size of the engine required must be calculated for the maximum load on the rope, which will occur when the loaded trip is on the 15-per cent. grade. The entire length of rope will then lie on a practically level road.

The first step is to determine the gravity pull of the loaded trip, for a 15-per cent. grade; and the friction pull of the entire moving load, including the loaded trip and the main and tail ropes; assuming the rolling friction to be 1/40 of the entire weight of the cars and ropes. A 15-per cent. grade is a grade having an angle of inclination whose tangent is 0.15, making the angle 8° 32′. This gives, for the friction and gravity pulls, as follows:

Friction pull of cars,

$$\frac{72{,}800 \times \cos 8^\circ 32'}{40} = 1820 \times 0.98893 = 1{,}800 \text{ lb.}$$

Friction pull of rope,

$$\frac{15{,}600}{40} = 390 \text{ lb.}$$

Gravity pull of cars,

$$72{,}800 \times \sin 8^\circ 32' = 72{,}800 \times 0.14838 = 10{,}802 \text{ lb.}$$

Total load on rope ..... 12,992 lb.

The total load on the rope is, therefore, say 13,000 lb. The power required to move this load at a speed of five miles per hour, or $(5 \times 5280) \div 60 = 440$ ft. per min., is

$$\frac{13{,}000 \times 440}{33{,}000} = 173+, \text{ say } 200 \text{ hp.}$$

The size of a duplex hoisting or hauling engine is always calculated on the basis of a single cylinder, or as though the entire power was to be developed in each cylinder. When winding at a speed of 440 ft. per min., the diameter of the drum being 5 ft., the drum will make

$$\frac{440}{3.1416 \times 5} = 28 \text{ r.p.m.}$$

The engine being geared 4 : 1, it will make $2 \times 4 = 8$ strokes for each revolution of the drum; and the speed of the engine will, therefore, be $28 \times 8 = 224$ strokes per min.

The steam pressure at the throttle being 60 lb., and assuming a ⅔ cutoff, the mean effective steam pressure in the cylinder may be taken as

$$m.e.p. = 0.9[0.917(60+14.7) - 17] = 46.35 \text{ lb. per sq.in.}$$

Now, taking this mean effective pressure, and assuming the ratio of length of stroke to diameter of steam cylinder as 1⅔, the diameter of the steam cylinder, for this engine, is

$$d = \sqrt[3]{\frac{200 \times 33{,}000 \times 12}{0.7854 \times 46.35 \times 1\frac{2}{3} \times 224}} = 18 \text{ in.}$$

The length of stroke is, then, $18 \times 1\frac{2}{3} = 30$ in. The required size of engine, for this work, is, therefore, a duplex 18x30-in., engine using steam at 60 lb. per sq.in. at the throttle and developing, practically, 200 hp., at a speed of 224 r.p.m.

Proposed Mine Siphon

I want to install in our mine a siphon having a total length of 500 ft. Starting from the upper basin, the pipe rises a vertical height of 2 ft. in 200 ft.; and then falls vertically 4 ft. in 300 ft. I want to use 3-in. pipe for the first 400 ft. and 2-in. in the remaining 100 ft. How much water will the siphon deliver?

Avella, Penn. MINE FOREMAN.

In this case the effective head, or the head actuating the flow of water is 4 — 2 = 2 ft. Since the total fall from the summit or crown of the siphon to the level of the water in the discharge basin (4 ft.) is less than the water column the atmospheric pressure will support, the flow of water in this siphon may be calculated directly by substituting the values for the 400 ft. of 3-in. pipe and 100 ft. of 2-in. pipe and the effective head (2 ft.), in the formula

$$G = (d_1 d_2)^2 \sqrt{\frac{800\, d_1 d_2\, (h_2 - h_1)}{l_1 d_2 + l_2 d_1 + 2.08\,(d_1 + d_2)}}$$

Referring to the accompanying figure, $l_1 = 400$ ft.; $l_2 = 100$ ft.; $d_1 = 3$ in.; $d_2 = 2$ in.; $h_1 = 2$ ft.; and $h_2 = 4$ ft. Substituting these values in the formula,

$$G = (3 \times 2)^2 \sqrt{\frac{800 \times 3 \times 2\,(4-2)}{400 \times 2 + 100 \times 3 + 2.08\,(3+2)}} = 105.8 \text{ gal. per min.}$$

The flow of water may be greater or less than this amount according to the condition of the interior of the pipe. Both

A PROPOSED MINE SIPHON

ends of the pipe should be submerged below the water level in the basins and all pipe joints made air tight with white lead.

A Difficult Question

A question asked at an examination, some time since, reads as follows: "If there are two airways started from the bottom of a shaft, in a 6-ft. seam, and driven 8 ft. wide, one being 900 and the other 3600 ft. long, how much must the longer airway be widened, in order to pass the same volume of air as the shorter airway?" The correct answer was, "The longer airway must be widened 6.4 ft." Please explain how this result is obtained.

MINE FOREMAN.

Philipsburg, Penn.

Under the assumed conditions, the height of the airway, volume of air passing and unit of ventilating pressure are the same for each airway. First, write the formula for ventilating pressure in terms of the airway and quantity of air passing, thus:

$$p = \frac{k\,l\,o\,q^2}{a^3}$$

Now, strike out the constant factors, leaving the expression, $\frac{lo}{a^3}$, which is the same for each airway. Therefore, calling the required width of the long airway x, and substituting the given values in this expression,

$$\frac{900 \times 28}{48^3} = \frac{3600 \times 2\,(6+x)}{(6x)^3};$$

or simplifying, $\frac{7}{1024} = \frac{6+x}{x^3}$,

which gives $x^3 - 146.3 = 877.7$.

Finding the value of x by trial in this equation, we find $x = 14.4$ ft. The airway must, therefore, be widened 14.4 — 8 = 6.4 ft.

Sociological Department

For the Betterment of Living Conditions in Mining Communities

Philadelphia and Reading Coal and Iron Co.'s Field Day

SPECIAL CORRESPONDENCE

The eighth annual competitive drill of the Philadelphia & Reading Coal & Iron Co.'s First Aid Corps was held at Lakeside Park, Saturday, Sept. 21, under the general supervision of W. J. Richards, the first vice-president and general manager. Dr. G. H. Halberstadt was in direct charge of the corps, and Dr. J. B. Rogers acted as sole judge of the work.

PROGRAM

A total of 700 men divided up into 72 corps entered the competition. The various teams from each district drew one of the following ten problems, and competed with each other. The corps which won in any district then competed with the winners of the other districts in the final contest. The trials were:

1. Compound fracture of skull and jaw.
2. (a) Foreign body imbedded in left corner. (b) Crush of right hand.
3. Dress burns of head, neck, body and arms.
4. Crush of pelvis and laceration of hip. Dress hip with spica.
5. Handling patient by one, two, three and four bearers and cross obstruction.
6. Rescue patient from electrical contact, carry 10 ft. and use artificial respiration.
7. Crushed foot, laceration of leg to middle third. Spiral reverse bandage.
8. Compound fracture of forearm with laceration of hand and fingers. Dress hand and fingers with spica.
9. Compound fracture of leg with dislocated thigh.
10. Fracture of spinal column.

FIG. 2. WADESVILLE NO. 3 FIRST-AID TEAM WITH SUBJECT BANDAGED FOR FOREIGN BODY IN LEFT EYE AND CRUSHED HAND

The winning teams were the following:

Colliery		District
Bear Ridge	94%	Gilberton
Otto	95%	Minersville
Wadesville & Bridgeport Transfer	97%	St. Clair
Good Spring	95%	Tremont
Potts Mammoth	94%	Ashland
West Shenandoah	96%	Shenandoah
St. Nicholas	96%	St. Nicholas
Locust Gap	96%	Mt. Carmel
Tunnel Ridge	99%	Mahanoy City

As the various teams entered the field, the nature of the injuries to be dressed were announced, and a large card was posted on the easel for the information of the spectators.

PRELIMINARY EXAMINATION

A criticism was made by someone present that the first-aid corps should be taught to diagnose cases before dressing. The corps in actual service should carefully feel the patient over and ascertain what is wrong with him before acting. For instance, through thoughtlessness, resuscitation methods might be used which would create a compound fracture.

The critic thought that it would be well to train the first-aid corps to realize that an injured man should be approached with caution and that this would be best effected by requiring the men at all meets to make a partial examination of the patient even though it would still be necessary, of course, to publish to the competing teams, the character of the injuries they were finally to dress. It would not be possible to imitate the actual wound, but it would be advantageous to represent in figurative action that search for injuries which should always precede dressing.

This criticism is easily answered by those who have had considerable experience in first-aid work. The injuries usually sustained by employees are easily diagnosed by the first-aid workers. This is evidenced by the fact that the Reading corps have not made one wrong diagnosis in the eight years during which they have been engaged in the work. This statement I have carefully verified.*

FIG. 1. TREATMENT OF COMPOUND FRACTURE OF SKULL AND JAW, AT LAKESIDE PARK MEET

*The suggestion made by the bystander may have been without merit, but it must be remembered that a correct diagnosis is not all that is needed. It is necessary that it be made with due care and without injury or strain to the patient. It is probable that in all cases of injury the attending first-aid men do ultimately learn from what the patient is suffering, but it is nevertheless essential that they should know the nature of those injuries before commencing their operations. Mimetic work symbolizing examination of the patient would serve to instill in the minds of the men that such examination is necessary.—Editor.

FIG. 3. THREE SUBJECTS TREATED FOR CRUSHED PELVIS AND LACERATED HIP

FIRST-AID MEN SHOW CONSUMMATE SKILL

A critical examination of the work of all the corps on Saturday revealed the fact that all were thoroughly conversant with the First Aid Manual, and had acquired a high degree of skill in the application of first aid. It may be well to recall the fact as shown in the table, that in the District contest only 5 points separated the highest and lowest team. The average obtained was high and the contestants may well be proud of the showing made.

It may be readily observed in the various photographs that all the subjects were dressed in accordance with the best methods extant, and the only reason lower marks were awarded to some of the corps than to others, was because of the omission of minor details and the failure to exercise the proper care in looking after the personal comfort of the subjects while their injuries were being dressed. The careful manner in which some of the teams tended the patients while dressing their injuries counted heavily in their favor.

A REVIVAL OF THE LOST ART OF BANDAGING

Fig. 1 shows a dressing of a compound fracture of skull and jaw. A decidedly interesting feature of one of the dressings was the perfect construction of the head bandage, the physician being unable to find a flaw in the work.

Fig. 2 shows the winning team and subject in one of the district contests, the patient being dressed for a foreign body imbedded in the left cornea and for a crushed right hand. An interesting feature was the fact that both injuries were dressed at the same time while a member of the corps supported the patient in a sitting posture.

Fig. 3 shows three subjects dressed for a crushed pelvis and a laceration of the hip, the hip being dressed with spica. As this injury is one which usually causes considerable pain, the manner of handling the patient while being dressed was carefully noted.

COMFORT DURING TREATMENT

The customary method is for three men to hold a patient while two others attend to the injury, but some of the teams use a method which is far superior. They carefully raised the patient from the litter and placed pieces of splints wrapped in strips of woolen blanket at several points along the litter, after which they carefully lowered the patient and the entire corps was able to work together with a resultant saving of valuable time. Moreover, the patient was relieved from the strain of uncertain support while being dressed, and the corps did not have the strain of holding him during the necessary lengthy period of bandaging.

The fifth feature of the program was interesting, as the patient had to be carried over an obstruction consisting of two benches and a table, the latter being about 3½ ft. high and 3 ft. wide. Upon it were placed several articles that impeded their passage.

It was interesting to note how carefully the various corps endeavored to pass over the obstruction without disturbing anything in their path. I could not help thinking what would happen to anything found obstructing a rescue corps in a gangway. It is safe to say that they would quickly dispose of any such obstacle, though they failed to do so in the contest. But it must be remembered that they were working in full view of 1600 spectators and were more or less embarassed.

Fig. 4 shows the winner of the contest in bandaging a fracture of the spinal column.

A valuable feature of the method of dressing the patient, who had a compound fracture of the lower left limb, was the placing of a cross-splint which securely held the leg in its dislocated position. Both limbs were rigidly bandaged to the long splints which reached far above the hip. The reader may be able to infer the excellence of this dressing when he is told that when the physician raised the lower part of the patient's

FIG. 4. WINNING TEAM IN EVENT, REPRESENTING TREATMENT OF PATIENT WITH FRACTURE OF SPINAL COLUMN

FIG. 5. THE WINNERS OF THE COVETED BLUE RIBBON AT PHILADELPHIA AND READING FIRST-AID MEET

body by grasping the cross-splinter near the feet, he failed to dislocate any part of the bandage.

Fig. 5 shows the winning subject and team which carried off the first honors, having a perfect score of 100%. The subject was dressed for an injury to the foot, leg, thigh and hip, using the spiral reverse for the leg and thigh, the figure eight over knee and spica over groin.

BEAR RIDGE COLLIERY WINS

The winning team is employed at Bear Ridge colliery and consists of Peter Shoppre, captain; Thomas Hobin, subject; John T. Thomas, Dennis Sheehan, Thomas McGrue. They were presented with the blue ribbon by Morris Williams, President of the Susquehanna Coal Co., who was introduced by Mr. Richards. The presentations to the other corps that competed in the finals were made by H. O. Bechtel, Judge of the Court of Common Pleas of Schuylkill County, and H. M. Wilson, engineer-in-charge, Pittsburgh Station, Federal Bureau of Mines.

A sumptuous dinner, furnished by caterers from Philadelphia, was spread under the trees of a picturesque grove in Lakeside Park. Eightéen hundred people partook of the refreshments. In the morning a buffet lunch was served near the exhibition field. Free transportation was furnished to all those who attended.

Meets in Northern Anthracite Field

Lehigh and Wilkes-Barre Coal Co. Meet

SPECIAL CORRESPONDENCE

The Lehigh & Wilkes-Barre Coal Co. held its third annual field day at Sans Souci Park, which is a short distance from Wilkes-Barre. The judges were Doctors F. L. McKee, D. N. Lake and J. W. Geist. A large crowd was present.

When the contests were over the judges announced that the chief prizes had been won by the outside workers' first-aid team of No. 11 Lance colliery, Plymouth.

The events and the winners were:

One-man event—Two problems, with all corps represented in both problems. Problem 1—Rescue a man found unconscious from gas, carry him 20 ft., and demonstrate the Sylvester and Prone methods. Problem 2—Dress a lacerated wound over head of left thigh bone, also the injury resulting from the kick of a mule in the right side of the abdomen. Won by Corps No. 7, comprised of the outside workers at the Stanton colliery.

Two-men event—All corps compete, two problems. Problem 1—An outside stableman has been kicked by a mule and received a compound fracture of the middle of the left leg, which is bleeding in spurts. Dress, using long splints. Problem 2—Dress an incised wound of the back extending from the right shoulder blade down across the back to the left and around to the front of the body. Won by team No. 14, comprising inside workers at Nottingham colliery, Plymouth.

Three-men event—All corps compete, two problems. Problem No. 1—Splint and dress fractured pelvis (style of splint equipment not rated). Problem No. 2—Simple fracture of left forearm and right collarbone. Won by team No. 11, comprised of outside workers at Lance colliery, Plymouth.

Full team event—All outside corps compete, two problems. Problem No. 1. Treat mule kick on right side of abdomen, a lacerated wound on the head and on the left thigh bone, a simple fracture of jaw, and a broken left thigh. Problem No. 2—Treat simple fracture of right forearm, a laceration of left hand, which is bleeding in spurts, a contusion or bruise of left eye. Won by team No. 11, comprising outside workers at Lance colliery, Plymouth.

The fifth event was for all inside corps, and there were two problems. Problem No. 1—Treat a simple fracture of the left thigh, a simple fracture of the jaw, a wound of the right shoulder and a wound 1 in. above bend of right elbow; bleeding in spurts; also a compound fracture of right forearm. Carry patient 50 ft. Problem No. 2—Treat a compound fracture of left thigh, a severe burn of the face, neck, right hand and forearm. Carry patient 50 ft. Won by team No. 12, inside workers of Lance colliery, Plymouth.

Full team event—Teams rating first and second in events Nos. 4 and 5 competing. Problem 1—Treat a fracture or dislocation of the spine, a fractured jaw, a lacerated wound of left temple; bleeding in spurts; a dislocation of left elbow, the forearm being found in position of right angle. Carry patient 50 ft. Problem 2—An explosion has occurred in a chamber 10 ft. long and 3 ft. high, one member of team rescues the laborer. On examination he is found to have a simple fracture of the right leg, also lacerated wound on top of head. Dress and carry 50 ft. Event won by team No. 11, outside workers of Lance colliery, Plymouth.

Pennsylvania Coal Co. Field Meet

SPECIAL CORRESPONDENCE

First-aid teams of the Pennsylvania Coal Co., and the Hillside Coal & Iron Co., held their annual contest at Valley View Park, near Wilkes-Barre. Six corps were entered, representing as many different districts of the companies represented. In order that the work might be realistic a large sloping platform was built with steps on each side. This represented an inclined plane. A shed under which was a car of coal, represented conditions as they are found around mines.

The teams represented were:

South Pittston district, Peter Hoolihan, captain.

Avoca district, G. Kellum, captain.

Forest City district, J. Jones, captain.

North Pittston district, J. Fullard, captain.

Dunmore district, C. Beecham, captain.

Mayfield district, J. O'Malley, captain.

Event No. 1—One-man event: Treat a fracture of right lower jaw and a wound on top of right shoulder.

Event No. 2—Two men to a team: A man is lying unconscious on his back over an electric wire; show two methods of rescuing; perform artificial respiration for one minute; treat burn on back; carry patient 50 ft. and return.

Event No. 3—Three men to a team: The injuries are supposed to consist of burns on face, chest and left arm up to the elbow, a compound fracture of right arm, 3 in. above elbow, with severe bleeding; treat patient.

Event No. 4—Four men to a team: A miner is caught by a fall of rock, and when he is removed it is apparent that he is in a serious condition, his mind is dazed and his face pale, pulse very weak, his body cold and his breathing shallow, his right foot and his leg half way up to knee are badly crushed, and severe bleeding has commenced; he complains of no pain despite his severe injuries and does not seem able to move his legs or the lower part of his body; patient to be treated and placed on a stretcher.

Event No. 5—For full teams: Victim has a severe scalp wound on the top of his head, a compound fracture of the left thigh at middle and a large artery is cut; his right hip is dislocated, with his toes turning outward; treat him and place him on stretcher and carry him up and down steps, then over the loaded car and transfer him to the ambulance.

Doctors W. S. Fulton, F. J. Bishop and D. A. Capwell announced the ratings of the different teams as follows:

Districts	Events 1	2	3	4	5	Average
Avoca	98	93	100	98	100	97⅕
Mayfield	98	93	91	100	93	95
Forest City	98	93	91	94	98	94⅘
North Pittston	91	96	98	93	95	94⅖
Dunmore	92	94	98	98	91	94⅖
South Pittston	98	91	91	100	88	93⅖

The Avoca team was presented with the Captain May loving cup. To retain permanent possession of this trophy it will be necessary to win three times. Prizes were awarded the winners and these included medals and gold pieces.

Lehigh Valley Coal Co. Field Meet

SPECIAL CORRESPONDENCE

First-aid-to-the-injured teams, representing six divisions of the Lehigh Valley Coal Co., held their annual contests at Hazle Park, Hazleton. The work of the contestants was so proficient that when the last event was over, four teams were tied for first honors and an extra event was necessary to decide the winner.

The team from No. 5 colliery, Mahanoy-Shamokin division, located at Lost Creek, secured the highest rating, and the team from the Westmoreland colliery, at Wyoming, captured second honors. The highest individual rating was made by Thomas G. Evans, captain of the Stevens colliery team, of West Pittston.

Each of the six divisions was represented by one team, which was selected at preliminary meets held a few weeks ago. None of the teams had any knowledge of the nature of the problems they were to work out, and not until these were posted on a bulletin board did the contestants know what first-aid work they were to demonstrate. Thus the winning teams showed not merely a knowledge of the worked performed, but an acquaintance with the whole manual.

The six teams entered in the contests were:

Stevens colliery, West Pittston, Lackawanna Division.

Westmoreland colliery, Wyoming, Wyoming division.

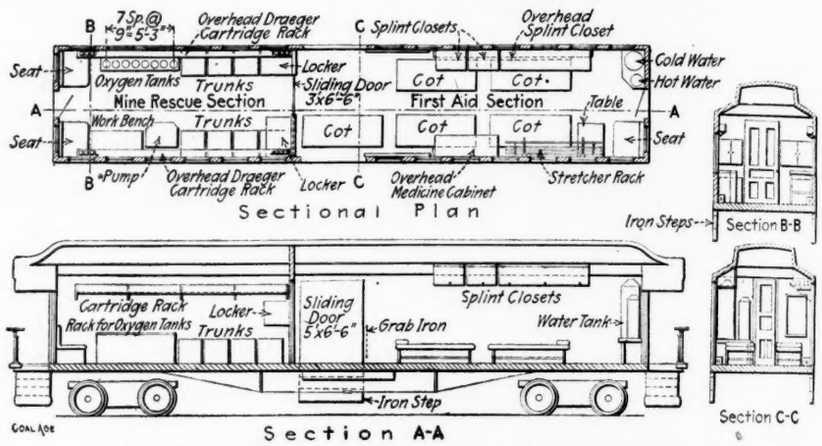
Drifton colliery, Drifton, Lehigh-Coxe division.

Primrose colliery, Mahanoy City, Delano division.

Packer No. 5, Lost Creek, Mahanoy-Shamokin district.

Blackwood Tunnel, Blackwood, Pottsville division.

Dr. A. G. Fell, of Wilkes-Barre, and Dr. E. G. Meyer, of Hazleton, were the judges.



THE RESCUE CAR OF THE LEHIGH COAL & NAVIGATION CO..

The events were as follows:

No. 1. For two men—Treat a simple fracture of middle third of left arm.

No. 2. For three men—A man has fallen, fracturing his nose and wounding his eye. He has also received a cut on the temple, which is bleeding severely. Treat with contents of first-aid packet.

No. 3. For four men—A man is rescued after an explosion. He is still unconscious and has been burned about the head, face, neck, left hand and forearm. Treat this subject.

No. 4. For full team—A man has been injured by a fall of rock. He has lacerations on top of the head and a deep cut in the palm of the right hand, the latter bleeding severely in spurts. He also has a compound fracture of the middle third of left thigh. Treat these injuries.

No. 5. For one man—Treat lacerations of forearm and back of right hand.

When the last event was over it was found that honors were divided between the captains of the following teams: Thomas G. Evans, Stevens; Anthony Gludding, Primrose; John McLean, Packer No. 5; James Morris, Westmoreland.

It was decided to hold an extra event so that a single team might be regarded as winner:

For one man—Treat fracture of the jaw and lacerations of right ear.

The rating of the various teams was as follows:

Packer No. 5	99
Westmoreland	98
Stevens	95
Drifton	94
Blackwood	82½

The first honors were given Thomas G. Evans, and second honors to Anthony Gludding. Evans made 99 points and Gludding made 95 points out of a possible 100.

The contests were conducted before a great crowd which included the various division heads and mine foremen from the various collieries.

The Old Company's Rescue Car

The Lehigh Coal & Navigation Co. recently purchased a second-hand passenger coach, and it is now being fitted for rescue work in the manner indicated in the accompanying sketch.

All the seats were removed except the three at the far end. The toilet appliances were taken out, and hot- and cold-water tanks, with a heater for same, installed in that corner of the car. A partition was built which divided the coach into two compartments, namely, those devoted to first-aid and mine-rescue work. By removing two windows on each side the carpenters were able to insert wide sliding doors.

There are eight 24x24x24-in. trunks, each containing a Draeger oxygen helmet. In the first-aid room everything necessary for scientific treatment has been carefully chosen and installed. Now that the entire interior of the car has been refinished, it has a complete and business-like appearance.

Safety Catches on Cages

Throughout the United Kingdom, at those collieries having rigid conductors—rigid in contradistinction to wire-rope—safety catches are seldom used, it being customary to suspend the cage from the rope with four or six chains instead of by rigid rods, the chains being periodically annealed in order to prevent crystallization (decarbonization) of the metal, due to vibration and concussion. Thus in Durham, to quote one instance given in the Blue Book, a special rule enjoins that the chains shall be annealed once in every six months.

Examination Questions

Selected from State Examinations, or Suggested by Correspondents

Firebosses' Examination

(Selected Questions)

Ques.—What are the qualifications, other than those required by the mine law, that a fireboss should possess?

Ans.—A fireboss must be thoroughly familiar with every portion of the workings of the mine and the system of ventilation; he must have a good theoretical knowledge of the gases commonly met in mines, and the effect of dust, temperature, and moisture to produce explosive conditions in the mine air. His experience must be such as to make him thoroughly familiar with the behavior of the different gases in mines and the means employed to remove them.

The fireboss must have a full knowledge of the construction and principle of the safety lamp, and understand its use and the danger of its misuse in the hands of a careless or incompetent person. He must be faithful and conscientious in his work and alert, possess good eyesight and hearing and must not be easily disconcerted or lose his head.

Ques.—Describe, briefly, how you would proceed to make the morning examination, as fireboss in a mine, stating the particular points to which you would give attention, and what you would do to insure the safety of the workmen when finding a working place in a dangerous condition.

Ans.—Reach the mine in time to make a thorough examination of the district in my charge, before the men go to work. Having previously cleaned, trimmed and filled my lamp and having carefully examined the same to see that it is in good condition, before entering the mine I would ascertain that the ventilating apparatus was working regularly. Upon reaching the shaft or slope bottom, I would proceed at once to the foot of the downcast, or its nearest approach on the intake airway.

After ascertaining that the usual quantity of air is passing in the main intake air course, I would, as far as practicable, follow the air current and examine the airways and working places in their order, in the district in my charge. As far as possible, I would test each working place with the safety lamp, giving particular attention to the high spots or cavities in the roof, or void places where gases would accumulate; and examine the roof for loose slate; and observe if any timbers had been knocked out by shots fired the night before.

I would pass through the crosscuts, from room to room, following the course of the air current. If any brattice was found displaced, I would fix it or place a danger signal at all entrances to the room. In the same manner, I would bar all the entrances to places where danger of any kind was found. In this way, I would follow the air current around my district, and return to the shaft bottom, where I would record the results of my examination in the book kept for that purpose.

Ques.—How would you remove firedamp from a working place, or render the gas harmless?

Ans.—When a considerable body of firedamp has accumulated in a working place, before any attempt is made to remove or disturb the gas the men working on the return current proceeding from the place, must be notified and withdrawn. Care must be taken to guard all approaches to the return current. This having been done the circulation of air in the affected portion or place must be increased as much as practical and, if necessary, a brattice must be erected to direct the air against the gas.

The work must be performed from the intake side and only safety lamps used. These must be kept back in a safe place to guard against a possible fall of roof driving the gas down upon the lamps. Sufficient time must be given to allow the air current to sweep away the gas, and the brattice must be extended, from time to time, as required. The work must progress slowly and frequent tests be made with the safety lamp.

Ques.—Explain briefly the general arrangement of the ventilation of a mine, in the blowing and the exhaust systems of ventilation, and show how these differ from each other.

Ans.—In the blowing system of ventilation, as the name indicates, the air is blown or forced through the airways by a pressure greater than that of the atmosphere. This pressure is created by some form of ventilator, generally a centrifugal fan. By the action of this fan, as indicated by the arrows in the accompanying figure, air is drawn in at the center and discharged at the circumference of the fan.

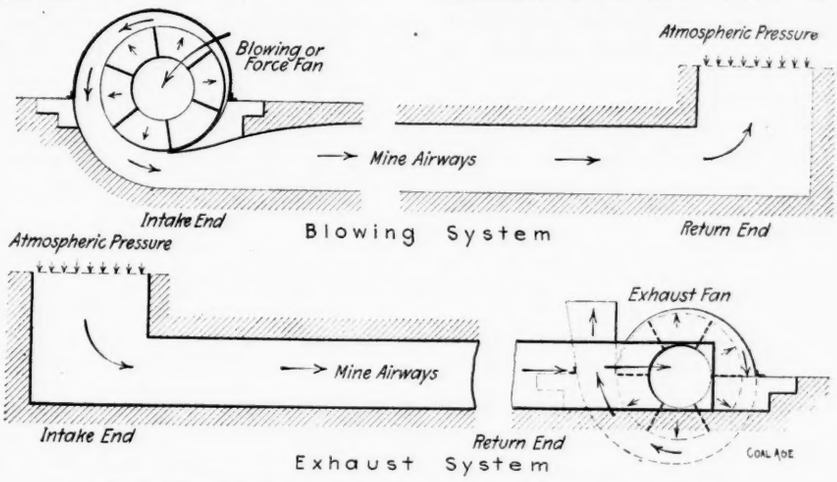


DIAGRAM SHOWING POSITION OF VENTILATING FAN FOR THE BLOWING AND EXHAUST SYSTEMS OF VENTILATION

The first arrangement illustrates the blowing system in which the discharge opening of the fan is connected with the mine airway, and the pressure established by the fan forces the air through the mine to the upcast shaft, where it is discharged against the atmospheric pressure.

The second arrangement illustrates the exhaust system in which the intake opening of the fan is connected with the mine airway. In this case, the atmospheric pressure forces the air through the mine, the fan acting to create a depression in the mine.

In the blowing system the mine is ventilated under a pressure above that of the atmosphere, while in the exhaust system the mine is ventilated under a pressure below that of the atmosphere. In the former case, the fan occupies a position at the intake opening of the mine, while in the latter case, its position is at the return opening.

Coal and Coke News

From Our Own Representatives in Various Important Mining Centers

Washington, D. C.

Coal on the Panama Canal

One phase of the Panama Canal act to which a good deal of attention is being given by the officials at the Isthmian Canal offices who are charged with that duty, is the making of preparations for applying the legislation relating to the question of supplying coal in suitable quantities to vessels, both government and private, that may pass through the waterway. The canal act provision which is being used as the basis of the investigations now in progress specifies that, "The President is authorized to establish, maintain and operate, through the Panama Railroad Co. or otherwise, dry docks, repair shops, yards, docks, wharves, warehouses, storehouses, and other necessary facilities and appurtenances for the purpose of providing coal and other materials, labor, repairs and supplies for vessels of the government of the United States, and incidentally for supplying such at reasonable prices to passing vessels in accordance with appropriations hereby authorized to be made from time to time by Congress as a part of the maintenance and operation of the said canal." The language thus employed, although considered somewhat ambiguous, is being interpreted to mean that the government shall establish suitable depots which shall furnish the coal and other supplies to government vessels and shall fix reasonable prices for furnishing the same to other vessels. It is not intended to admit private persons to the competition, so that the coal trade on the Isthmus will be practically entirely, at the start at least, a government monopoly. It is recognized by government officers in charge of this work that the regulations they succeed in establishing will be of very great importance in determining the movement of freight through the canal, inasmuch as the price of coal delivered in the canal will, other things being equal, determine the choice of route by a vessel which has to take on fuel in transit. Estimates have already been elaborately made by an expert employed for that purpose by the government, with reference to the price at which coal can be delivered in the canal. This is based on existing rates for shipping, and presupposes that contracts will be made with American coastwise ships, which will bring the coal from the terminus of the Virginian Ry., or from Newport News. The charge for storing and loading will be reduced to the minimum, in order to stimulate the traffic through the waterway. The price of the coal in the canal will consist largely of the cost at point of shipment in the United States, plus the tonnage charge for transportation to the canal. A supplementary report on this question is expected very shortly from the expert who has been investigating the subject.

The Government and Car Shortage

Reports of car shortage as affecting the coal supply have been received with considerable apprehension by government traffic experts. Commissioner Prouty, now chairman of the Interstate Commerce Commission, in a statement on the subject lately made, takes a rather gloomy view of the whole car-shortage situation. With particular reference to the coal question, Mr. Prouty says:

> The danger point today is with respect to service and facilities. It is the general idea that the Commission's business is to stand for the shipper against the railroads. I would remind you that conditions have changed from what they were several years ago, and that it is as much our duty to see that the railroads are allowed reasonable rates as for us to look at the matter only from the standpoint of the shipper.
>
> If the business of this country is to develop, the railroads must develop also. In the next ten years the railroads must add materially to their facilities, must buy cars and better equipment.
>
> Where is the money with which to do these things coming from? It must come from the same source it did in the first place—from private investment. Therefore, the railroads must make sufficient money both for the paying of their current expenses and for the profit to their stockholders, to whom we look for the investment.

This utterance is taken as somewhat of an apology for the attitude of the commission in keeping down the advances in coal rates which have been proposed from time to time for a good while past. The commission is by no means a unit on this question, and it is believed that the division of view between the two wings will grow a good deal more acute before the subject is finally disposed of. Meantime, however, it is a matter of some encouragement to the roads to see that the feeling in favor of higher rates as a government policy is undoubtedly on the increase.

To Investigate Conditions

It is considered probable from statements made by democratic leaders that strikes in the coal regions will again be investigated when Congress resumes work. One or two resolutions providing for such inquiries into individual strikes are already before the lower chamber, having been offered before adjournment, and the statement is made that others will be taken up and probably consolidated with those now pending, so as to make a general investigation into labor conditions in the coal regions.

In addition, it is now unofficially stated that one of the principal pieces of work that will be given to the new Industrial Commission will be an examination into the relations between capital and labor in the coal fields. This has been predicted ever since the movement for the organization of this commission first gained headway, but the statements on the subject are now made in a much more pointed and positive way than ever before. There seems to be no doubt that they are well founded.

Pennsylvania

Anthracite

Pottsville—Eight thousand men employed by the Lehigh Coal and Navigation Co. went on strike September 20, because several men employed at the Nesquehoning Colliery refused to wear union buttons. This is the largest and most serious strike that has taken place in this region within the last five years.

Scranton—The danger from the mine cave which occurred Monday afternoon in the rear of the 200 block, North Main Avenue, seems to be over for the present. A slight subsidence is naturally expected for several days after a cave of this nature occurs.

Pittston—The extensive improvement work that has been in progress in the old No. 1 shaft of the Pennsylvania Coal Co. on Broad Street for the past two years, is nearing completion. The underground tunnel driven a few years ago now provides drainage for the greater portion of the workings of the company and small steam pumps are used to keep down the water in low sections of the mine.

Shamokin—An enormous fall of coal occurred at the Hickory Ridge Colliery owned by the Susquehanna Coal Co. as Morris Starr and James Dorsett were sounding the room for a breast. They were entombed and when a rescuing party entered the breast, Starr was found crushed to death and his companion seriously, if not fatally, injured.

Wilkes-Barre—Two miners, both employed in No. 5 shaft of the Pennsylvania Coal Co. were injured Sept. 13 by a fall of rock. They were taken to the Pittston Hospital. One was suffering from a severe scalp wound and a fractured rib, while the other was cut about the face and head.

In an explosion of gas in the Mineral Springs Colliery of the Lehigh Valley Coal Co., at Parsons, two mining engineers, a fireboss and a laborer, were seriously injured. The explosion was caused by gas escaping through a cave hole in the roof of the vein where the engineers were working. Fireboss Williams carried a naked light which came in contact with the gas from the vein above, causing the explosion.

Mocanaqua—A gas explosion took place in the Mocanaqua Mine Sept. 14 and five men were badly hurt. The laborers injured were blown in different directions, all being in the body of gas when it was ignited. It is believed that all the men injured will recover.

Philadelphia—District President Kennedy of the United Mine Workers of America, has denounced in vigorous language the report spread broadcast that the mines are being run short-handed and that there is great demand for labor in the anthracite field. He says this is not true.

According to investigations made by Samuel J. Jennings, inspector for the Eighth Anthracite District, the miners are making their own work hazardous. He points out that miners are using more than one kind of explosive in blasting coal and that hundreds have a common practice of exploding dynamite with a short fuse. Such practices are against the State Mining Law and miners who follow them are taking their lives in their own hands.

BITUMINOUS

Pittsburgh—Considerable interest has been manifested throughout the entire country in the series of experiments conducted at the experimental mine at Bruceton, a detailed account of which appears elsewhere in COAL AGE. Some of the press reports of these experiments are perhaps a trifle exaggerated.

A medal has been awarded the H. C. Frick Coke Co. for its specialized exhibit in accident prevention, industrial hygiene and mutuality at the International Exposition of Hygiene at Dresden, Germany. An additional honor was given their exhibit by making it a permanent part of the great Berlin Museum of Safety. The Frick exhibit is the first non-German exhibit ever established in the German Museum.

Somerset—Albert Lowry, a mine foreman of Addison township, pleaded guilty, Sept. 13, to violation of the state mining laws in turning rooms in the Ansbach mine in advance of the ventilation and failing to report daily the condition of the mine in the record books. He was sentenced to serve ten days in jail.

Washington—A deed has just been filed for record covering the transfer of a large tract of Pittsburgh or River vein coal in Smith and Mt. Pleasant townships. James S. Campbell disposes of 306.321 acres of coal to the Pittsburgh Coal Co. The consideration is $36,-052.10.

Connellsville—Nicholson Brothers, of Connellsville, will resume drilling, Sept. 21, to ascertain the coal formation of the 10,000 acres option, near Alice, by J. M. Ritter, of Zanesville, Ohio. Development of the property was halted following a boiler explosion on May 6.

The Carnegie Coal Co. has purchased 1000 acres of Pittsburgh vein of coal near McDonald, Penn.

Directors of the Superba Coal Co., at a semi-annual meeting recently, ordered the output of the company doubled by the opening of a new mine and the installation of new machinery and equipment. Work already has been started on the new mine opening into the 150-acre tract of land owned by the company near Evans Station, and lumber and other materials have been delivered. This mine will have a capacity of 1000 tons a day and shipments will be made over the Pennsylvania R.R.

Coral—A coroner's jury exonerated officials of the Wharton Coal Co., in Coral, from all blame for the mine explosion which killed one man and injured two others, after the mine had been pronounced safe by government experts. A more detailed report of this accident appears elsewhere in COAL AGE.

West Virginia

Gary—The United States Coal & Coke Co. is expected to expend $250,000 for sanitation and welfare work in the near future.

Wheeling—Shipments of coal and coke over the Norfolk & Western during the month of August were about normal. The coke sent out from the Pocahontas field was exceptionally so, the total for that commodity being 92,018 tons. The coal shipments were as follows, the figures being taken from the office of the chief mine inspector: Pocahontas field, 1,339,466 tons; Tug River field, 221,176 tons; Thacker field, 250,842 tons; Kenova field, 92,949 tons, and the total coal, 1,904,433 tons.

Stockholders of the 13 subsidiary railroads of the Baltimore & Ohio in West Virginia will hold special meetings Sept. 25 to merge with the parent company.

A big coal deal was closed in this city Sept. 10, when the mineral wealth underlying five farms in Richland district became the property of local operators. Four hundred and eighty acres of coal of the best quality of the Pittsburgh vein was purchased for a sum close to $25,000.

Charlestown—The week has brought no material change in the strike situation in the Kanawha district. All efforts at reconciliation between miners and operators have failed. The limits of the martial law zone have been extended. Several company buildings have been destroyed by fire and incendiarism seems to be rife.

Ohio

Hamden—For a consideration of $30,-000, Harry N. and Cyrus L. Wantz, at Miamisburg, Ohio, today disposed of a one-third interest in a tract of 3222 acres in Brown Township of Vinton County. The property is coal land exclusively.

Columbus—Secretary B. F. Pugh, of the Michigan-Ohio-Indiana Coal Association, has filed a number of claims against the Cincinnati, Hamilton & Dayton R.R., seeking to have that road pay for coal lost while in transit.

Maryland

Baltimore—The Stockholders' Prospective Committee of the Alabama Consolidated Coal & Iron Co. today heard a report from Harry E. Coffin, trustee in bankruptcy, which it is said gave the committee much valuable data for use in a plan of reorganization.

Bondholders committee of the Cumberland Basin Coal Co., of which Geo. C. Jenkins is chairman and which bid in the property of the concern at the trustees' sale on Monday last, is now preparing for reorganization of the corporation. A new company, which will probably be incorporated in the state of Maryland, will be formed to acquire the old company and under the plans of reorganization the new corporation will issue first and second preferred stock which will be exchanged. It is understood that the first preferred stock will be $700,000, and the second preferred stock $412,225, while $647,500 common stock will also be issued. The company owns extensive coal lands in Allegheny County, Md., and was financed by Baltimoreans.

Kentucky

Eastern Kentucky is coming forward as one of the greatest coal regions in the United States. The Consolidation Coal Co., of Fairmount, W. Va., has bought 100,000 acres of coal there, bonded their company for $30,000,000 and built 30 miles of railroad through the Cumberland Mountains to make an outlet for their coal. The Berwind-White people who have extensive operations in Pennsylvania have purchased 100,000 acres in eastern Kentucky which will soon be developed by branches from the Chesapeake & Ohio to their territory. Another large firm of Boston capitalists

have bought 30,000 acres in this region and surveys are being made to build branch railroad lines for development.

Lexington—With the capital stock fixed at $500,000, the Kypadel Coal & Lumber Co., composed of Eastern capitalists who are making investments in coal and timber land in eastern Kentucky, filed articles of incorporation here, Sept. 17. The company, it is stated, does not intend to improve or develop the lands at this time.

Fire destroyed the McHenry Coal Co. tipple, power house, boiler house, machine shops and a part of the coal chute, Wednesday morning, Sept. 19.

The blaze caught in rear of the power house and as the buildings were close together, it was impossible to stop the flames, they having gained considerable headway before being discovered. This is the second time this mine tipple has burned in the last ten years.

The mine is located on the Illinois Central R.R., 110 miles south from Louisville, Ky.

Peach Orchard—The Crystal Block Collieries Co., which was recently organized at Peach Orchard, Ky., will shortly begin the development of 22,000 acres of coal land near that point. The plant will be electrically operated and the necessary equipment is now being purchased. The company has a capitalization of $150,000, J. J. Johnson, of Ashland, Ky., being the chief stockholder.

Alabama

Birmingham—The Central Coal Mine Co.'s mine No. 3 is rapidly nearing completion at Kimberley, Ala., and when finished will be one of the most modern mines in the state. A double-track slope has been driven down 215 ft. to the coal at this mine. The boiler foundations are expected to be finished within a few days.

Tuscaloosa—It is expected that two or three mines will be started in this vicinity in the near future. These mines will probably turn out from 1000 to 1500 tons of coal per day.

Tennessee

Nashville—The Van Buren County Coal Co., incorporated with an authorized capital of $1,000,000 is desirous of building a railroad from Walling on the Tullahoma branch of the Nashville, Chattanooga & St. Louis R.R. for a distance of about 10 miles to touch a tract of 10,500 acres of coal and timber land.

Indiana

Evansville—All coal mines in this section will be running full capacity by Oct. 1, it is believed.

The Ingle Coal Mine in this city that has been shut down for several months for repairs will open Monday. Employment will be given to more than 200 miners.

Terre Haute—The Coal Hill Coal Mining Co. has filed articles of incorporation with County Recorder Frank Hoermann, with Marshall G. Lee, James B. Mulliekin and Leimis Evans directors. The capital stock is given at $50,000, divided into 500 shares of $100 each.

Seeleyville—Fire which started in the fourth west entry of the Vandalia Coal Mining Co.'s mine a few miles west of here, Sept. 20, caused a panic among the 300 miners at work, they fearing a repetition of the accident of a few years ago when the miners were overcome, following an explosion of gas. Those overcome and otherwise injured by reason of a scramble to get out of the mine were taken to their homes.

Brazil—A deal in mining property which has just been consummated near this city means the opening up of a new coal field near enough to be of great benefit to Brazil. Arthur Allais, of Chicago, and Edward Allais, of Christopher, Ill., have purchased the mining property at Billtown formerly known as the Collins Coal Co. and will proceed at once to develop it.

Illinois

Springfield—Illinois as a coal-producing state is on the boom. Figures in the annual coal report for the year ending June 30, given out today by the chief clerk of the state mining board, show that the coal production for the year was 15% heavier than of the year before, a tonnage increase of approximately 7,500,000 tons.

Rock Island—Industrial accidents in Illinois during 1911 caused the death of 552 persons, of which 151 were killed in coal mines.

Lovington—After a long period of idleness, caused by a fire in its workings, the Lovington coal mine is again opened. The burned section of the pit was sealed off and when reopened the fire was found to be extinguished. It will probably be three days before the air is sufficiently clear to permit the miners returning to work.

Bloomington—The MacLean County coal mine is still operating but a very small part of their full force of men and do not expect to begin active winter operations for several weeks yet. Their present force is sufficient to care for the local demand among the factories and schools and a few shipping orders.

Shelbyville—George W. Huffer, member of the Shelby County Title Abstract Co., has consummated a deal for the turning over of 25,000 acres of Shelby and Fayette County coal right to an Eastern syndicate which will develop the coal fields in the southern part of this, and the northern part of Fayette County.

Lincoln—Six men were injured and a dozen others trapped by an explosion of gas in the Latham mine near here, Sept. 12. The explosion occurred at 11:40 and it was nearly three hours before the men were rescued, all nearly dead from the effects of gas. The injured were rushed to hospitals. It is believed that none will die.

Harrisburg—Silas Foster, assistant electrician at the Saline County Coal Co.'s mine, was recently found apparently dead, lying across an electric wire. A pulmoter was sent down the mine, and after a few hours' work, Foster was revived and out of danger.

Kansas

Independence—J. E. Sickles, the capitalist of San Antonio, Tex., is authority for the statement that an 8-ft. vein of anthracite coal has been found near Sycamore, this county, and that a mine will be opened soon.

Arkansas

Little Rock—There is considerable activity at some of the mines, near Hartford, in Sebastian County, but some are still idle. The Hartford Smokeless Co. and the Harbattle mines are being worked on full time, and have more orders than they can fill. The Bolen and Central Coal & Coke Co. have orders for more machine-mined coal than they can produce in three years, and are ready to resume work as soon as the machine-mined scale is satisfactorily settled and signed.

New Mexico

Sante Fé—The 200 coke ovens at Gardener were lighted for the first time in several months Sunday evening, and will henceforth continue in active operation throughout the winter. Between 350 and 400 tons of 40-hour coke will be burned each day as soon as the ovens' full compliment of men is secured.

Texas

Bastrop—During the past several days the miners at two of the coal mines north of Bastrop have been out on a strike. The strike occurred at the Phelan and Glenham coal mines. The men at first demanded their pay every two weeks, which demand was granted by the management; then they demanded pay once a week and an increase of wages, which was refused, and the miners went out of the two mines in a body.

Nevada

Goldfield—The development of commercial deposits of coal in southern Nevada, long regarded as a possibility that was extremely remote, has apparently become an accomplished fact, and the product of the coal fields near Coaldale is now being successfully used in several

of the mining camps of this section. This is a semibituminous coal and is said to be well suited for most purposes of heating and domestic use.

Arizona

Phoenix—The Northwestern Coal Distillation & Power Co. has been incorporated with a capital stock of $1,000,000. The business of the company as set forth in the articles of incorporation will be: "The mining, converting, preparing for market, and otherwise producing, and dealing in coal, coke and the products and byproducts thereof."

Oklahoma

Tulsa—The largest charge of black powder ever fired at one time in the State of Oklahoma uncovered 12,000 tons of coal on the lease of William Lynch, four and one-half miles northeast of Tulsa, late Monday afternoon, Sept. 9.

Muskogee—The unallotted Indian lands in the Choctaw and Chickasaw nations, comprising approximately 900,000 acres, will be placed on the market within the next 60 days and sold at public auction to the highest bidder. Immediately following the sale of the unalloted lands the surface of the segregated coal land, 445,000 acres will be placed upon the market.

Foreign News

Berlin, Germany—Twenty men were killed and many others injured, Sept. 17, in the collapse of a partition in the Augusta Victoria colliery, at Recklinghausen, in the Westphalian coal field. Rescue workers at once entered the shaft and began digging the mass of wreckage that covered the bodies. Because of the inability to blast for fear of tearing the bodies underneath, the work was tedious. Several miners who were pinned down by their legs were taken to the surface weak from loss of blood.

Sheffield, England—After a test of several weeks, both practically and analytically, the Rhondda Rescue Station Committee has placed their order for Westfalia rescue apparatus with the Mining Engineering Co., Limited, for the complete equipment of their station, which is the largest in the United Kingdom.

St. John's, Newfoundland—After great hardships in the frozen North, Capt. John J. Bartlett, of the steamer "Neptune," of this port, who headed a gold-hunting expedition to Baffinland, returned to this harbor, reporting last night the loss of one of his ships and the discovery of extensive coal deposits but no gold.

Construction News

Indiana, Penn.—Russell Coal Co. is installing the Parsons system under six 150-hp horizontal tubular boilers at Victor coal mine, near Clymer.

Husband, Penn.—Plans are under way for the extensive development of a large tract of coal land near Husband, Somerset County. The tract is owned by D. B. Zimmerman. Under his direction drillers have been at work for some time.

Wilkes-Barre—To increase the output of the Loomis Colliery, at Dundee, the D. L. & W. Co. has prepared a set of plans for the erection of a large modernly equipped new breaker and several mine buildings at that place.

Pittsburgh—A gigantic hydro-electric power plant involving an expenditure of $15,000,000, and designed to generate 200,000 hp. from the waters of the Clarion River, about 50 miles from Pittsburgh, will be started in the spring of 1913.

Bristol, Va.—The Bewley Darst Co. announced today that it has succeeded in raising $250,000 to be used in the construction of a central power plant at the St. Charles, Lee County, Va., coal field, better known as the Black Mountain fields.

Washington, Penn.—Ground has been broken by the Pittsburg & Buffalo Coal Co., at Marianna for 500 additional coke ovens. This will increase the number of ovens at that place to 1000 and insures steady operation during the coming winter.

Philadelphia, Penn.—An important extension of facilities for the handling of coal traffic is being made by the Philadelphia & Reading Ry., in the construction of fully equipped yards for the weighing, classification and making up of coal trains at the northern terminus of the Reading division between St. Clair and Port Carbon.

Connellsville, Penn.—The Sunshine Coal & Coke Co. has just completed a new modern and commodious machine shop at their Francis No. 1 plant on the Monongahela River. The shop is of tile construction with slate roof, and its dimensions are 30x60 ft. Work has been started on a 76x37-ft. barn of the same construction, capable of housing 30 head of horses.

Fairchance, Penn.—Contractor C. H. Nixon, of Fairchance, has been awarded the contract for reconstruction of nearly 300 ovens for the H. C. Frick Coke Co. at Kyles and Brownfield works. The old ovens, which are of the beehive pattern, will be rebuilt of the machine pattern. The ovens will be so constructed that the Covington coke drawing machine will be used to draw the coke. Work will be commenced immediately in the reconstruction of 280 ovens.

New Incorporations

Dover, Del.—Charters were filed, the Carolina Public Service Co. Capital stock, $2,000,000. To manufacture and deal in and with ice refrigerating plants to acquire coal timber and mineral lands. Herbert H. Latter, W. J. Maloney, E. B. Davis, all of Wilmington, Del.

Elmore, W. Va.—Mead-Pocahontas Coal Co., of Elmore, Wyoming County, W. Va., to mine coal, cut timber and manufacture lumber. Capital, $60,000. Incorporators are J. A. Wood, of Sullivan, W. Va., W. G. Hubbard, of Charleston, W. Va., and C. H. Mead, of Peytona.

Columbus, Ohio—Organization plans have been completed by the Gibson Spencer Coal Co., which has just been formed with a capital of $10,000 to do a jobbing business in coal. The new company has opened offices in the Columbus Savings & Trust Co. Building. S. C. Gibson is president and Paul G. Spencer secretary and treasurer.

Philadelphia, Penn.—A great mining corporation has been formed by a group of capitalists headed by Wharton Baker, a widely known mining authority of this city, to develop more than 60,000 square miles of rich territory in the heart of Brazil. Articles of incorporation were filed recently in New Jersey, and Samuel E. Adair, noted engineer and adviser to the late H. H. Rogers, of Standard Oil fame, is now in Bahia looking after the recording of the deed. Samuel Adair is president.

Personals

Tom L. Lewis, of Bridgeport, Belmont Co., has been chosen the Republican nominee for secretary of state to fill a vacancy on the ticket caused by the resignation of John L. Sullivan, who accepted the same nomination on the Progressive ticket.

Harry B. Jones, the director of the Pittsburg Buffalo Co., who was reported accidentally shot at the mines of the Big Hill Coal Co., near Bennington, Ky., was only slightly hurt and will return to his home in Canonsburg, Penn.

Geo. H. Barker, vice-president of the Maynard Coal Co., has returned from a business trip in the East. He is optimistic of the general outlook in the coal business and says that a car shortage is about the only element that is giving the producers cause for worry.

Wm. A. Baxter, National organizer of the United Mine Workers of America, arrived in Wilkes-Barre after an absence of several weeks. He has been visiting his family in Beacon, Iowa, the same town in which President John B. White lives. He says the president will take a short vacation before he comes East.

Obituary

H. M. Taylor, the well known Chicago coal man and president of the American Federation of Coal Operators, has widespread sympathy over the loss of his wife and injury to himself and two children in an automobile accident, near Wheatley, Ont., September 10. The Taylor family were touring and the accident was the result of the caving in of a stretch of road which had recently undergone repairs. Mrs. Taylor was instantly killed. The injury to Mr. Taylor consisted of an arm broken in two places. The children were not seriously hurt.

John W. Skeele, president of the Lehigh Valley Coal Sales Co., died at his home at Paterson, N. J., on Sept. 17. Mr. Skeele was one of the most prominent men in the selling end of the anthracite business and was considered one of the highest authorities in the country on this branch of the industry. He had been with the Lehigh Valley Coal Co. since 1892, and previous to that time he was connected over a long period with the Reading Company. He was for a time a director of Coxe Bros, & Co., and also of the Lehigh Valley Coal Co. before the formation of the Sales Company. Mr. Skeele had been in charge of the marketing of his company's product in New York since about 1900, and previous to that time was located in Chicago.

Coal Trade Reviews

Current Prices of Coal and Coke and Market Conditions in the Important Centers

General Review

The bituminous market is firm in all grades. The inadequate car supply has seriously interfered with the production and the shortage has become pronounced in every part of the country. The same applies to anthracite except that the situation is even more acute.

Eastern bituminous selling agencies claim that most of the tonnage is going West. The West Virginia labor trouble is curtailing production and the possibility of this spreading to other districts is causing operators to hesitate about contracting ahead. The movement coastwise is inadequate to meet contract requirements, and there is every evidence of an active spot market soon.

Anthracite wholesalers appear unable to make any impression on their orders and the trade seems to be getting into serious shape. The demand still increases faster than the supply, and some consumers have been compelled to buy bituminous and coke. The movement is being interfered with by the inadequate car supply, and the dealers at some points are seriously considering increasing prices.

Ohio reports a good demand for all grades and the trade quite active. There is an upward tendency in prices, the requisitions on contracts are beginning to increase, and operators are not regarding new business with any favor. Efforts are now being made to stock up, but the movement has begun rather late. The car shortage is becoming worse daily, and dealers are discussing a sharp advance in prices. Production for the state is probably only about 50 per cent. normal.

In the South the market is quite strong, particularly for the steam grades, and everything points to an active season; the car shortage is developing to serious proportions. Trade in the Northwest is quite good and the market brisk; the arrivals are fair, except the smaller sizes which are in great demand.

Unusual strength has developed along some lines in the Middle West, with certain grades commanding ready premiums. The car shortage is general, except at the docks, where the heavy arrivals of grain is providing ample equipment. Prices on all grades are firm and some coals are experiencing spectacular advances. Operators are expecting the best business they have had for a number of years.

Boston, Mass.

Bituminous is firm in all grades. On Pocahontas and New River the $2.90 and $3 price is being held with but few exceptions, although sales and receipts at tidewater are small compared with the volume of coal going West.

The troubles in West Virginia are so far confined to the Kanawha region, but the possibility of a spread to New River keeps operators anxious and forbids much selling of futures. Coastwise, the movement is slightly behind contract requirements, and unless there is catching up all along the line, there will be a spot market of some interest in the course of 60 days. Georges Creek and favorite grades from Pennsylvania are coming down slowly.

All-rail movement is also slowing up. Orders that are restricted to certain kinds of cars are being passed over for the present, or until consumers decide to accept what can be had. Prices have hardened all along the line.

Water freights are firm at 95c.@$1 on large vessels, Hampton Roads to Boston, but comparatively few charters are made. The fear of detention at the Virginia terminals is causing Eastern contractors to delay, but there is apparently no let-up in the demand for export or for the line and Western markets.

Anthracite is rapidly getting into more and more serious straits. The continued warm weather is only putting off a day of reckoning for many dealers. The high premiums asked in the open market, and the low retail prices which still prevail in many places, present a difficult situation. In cities like Haverhill, Mass., which largely rely on tidewater deliveries, but yet have their coal rehandled through a distributing center like Newburyport, there are free predictions of $10-coal by Dec. 1.

Several of the smaller towns along the coast have been unable to get their usual supplies by schooner from New York and are coming down to places like Bangor and Portland for coal, when these cities are extremely short for their own requirements. There is now a concerted move among large distributors to get consumers to take chestnut for stove and broken for egg to help out on the great shortage of egg and stove. Stove has now been advanced in most places to the chestnut price, and there should be larger receipts of the latter size as the season goes on.

Current wholesale quotations are about as follows:

Clearfields, f.o.b. mine	$1.15@1.35
Clearfields, f.o.b. Philadelphia	2.40@2.60
Cambrias, f.o.b. mine	1.25@1.45
Cambrias, f.o.b. Philadelphia	2.50@2.70
Somersets, f.o.b. mine	1.25@1.40
Somersets, f.o.b. Philadelphia	2.50@2.65
Georges Creek, f.o.b. Philadelphia	2.77@2.95
Pocahontas, New River f.o.b. Hampton Roads	2.85@3.00
Pocahontas, New River on cars Providence	3.95@4.15
Pocahontas, New River on cars Boston	4.00@4.25
Anthracite stove f.o.b. New York	5.20@6.50

New York

Anthracite—There is no change in the hard-coal situation here nor any prospects of the shortage being relieved. All that arriving is going immediately into consumption and is entirely inadequate to meet the demand.

When navigation closes on the Lakes, a considerable tonnage will be diverted to the Eastern markets, but until that time there is little hope of any improvement in the arrivals here. The movement on the railroads is reported to be quite good, but production has been seriously interfered with by the inadequate car supply. Should this continue unrelieved, it will further aggravate an already rather discouraging situation.

The smaller sizes still continue in good supply, while stove and egg are quite short and commanding good premiums. Quotations are quite uncertain and fluctuating daily, but we quote the following as about the average:

	Upper Ports	Lower Ports
Broken	$5.00	$4.50 @ 5.00
Egg	5.25	5.50 @ 6.40
Stove	5.25	5.50 @ 6.40
Nut	5.50	5.50 @ 6.40
Pea	3.50	3.35 @ 3.75
Buckwheat	2.75	2.25 @ 2.50
Rice	2.25	1.95 @ 2.05
Barley	1.75	1.60 @ 1.70

Bituminous—The soft-coal companies at this point are declining to make any new contracts at any price, and are experiencing a great deal of trouble in keeping their customers satisfied. Spot prices have reached a point where they are practically prohibitive.

The movement on the railroads, particularly the Pennsylvania and the B. & O., is excellent, but this is probably due to the small tonnage being hauled. The car supply at the mines is entirely inadequate and shipments considerably below normal. With such conditions in effect now, before the crop movement has fairly started, operators are wondering what the conditions will be later.

Some companies report that they are a

full week behind on orders and consider the outlook grave. Little or no coal can be obtained in the open market, but we quote the following as nominal quotations:

West Virginia, steam	$2.65@2.75
Ordinary grades Pennsylvania	2.70
Fair grades, Pennsylvania	2.75@2.85
Good grades, Pennsylvania	2.90@3.00
Best Miller, Pennsylvania	3.05@3.15
Georges Creek	3.30

Philadelphia, Penn.

The dealers show no let up in their eagerness to secure coal, and the operators are doing their best to comply with their demands, with little or no success. Some of the dealers claim to be able to furnish any size of coal when called for, and in their advertisements point to the benefit of securing supplies early, as there is every indication of a shortage when the winter weather starts in, but when they receive an order for a cellar full of coal, particularly stove, it is likely met with the statement that it will be furnished a couple of tons at a time.

The dealers are apparently conserving what little of this size they receive, and trying to make it cover as much ground as possible. Suggestions are made that chestnut will possibly suit as well, but householders look askance at the 25c. difference in price. However, it is rapidly approaching the time now, when it will be any size or nothing. The wholesalers do not apparently seem to be able to make any impression in their orders. Where one is completed, three come along to take its place, and most of them claim to be sold up on their output until the first of the year. There is undoubtedly a strenuous time ahead in the anthracite industry.

The bituminous market still shows improvement. Calls on contracts are beginning to increase, and offers of new business are not looked upon with favor, unless at the prevailing prices. There is an upward tendency for all grades of coal, and the market looks better daily.

Baltimore, Md.

Realizing that the car shortage is becoming more and more serious, there was a decided rush to purchase coal during the past week, and as a result the local trade was fairly swamped with orders. The demand was so heavy that few operators could handle the business, for the reason that cars could not be had, and the movement of the product was unusually slow.

Many operators had a serious time meeting their contracts, and were unable to accept any spot business to speak of. The car shortage produced such a famine that some consumers offered to pay any price for prompt shipment. The lower grades have jumped from 10 to 15c. per ton, and not a few operators disposed of their product at as high as $1.20. The next best grades could not be had for less than $1.50, while Georges Creek Big Vein is bringing slightly better than $1.70.

Shippers over the Western Maryland experienced considerable trouble during the week. For three days the general manager of the road was out on the line helping to keep the big coal traffic moving. The tieup at Hagerstown was serious, and resulted in restricted shipments. The amount of coal handled over the company's piers was greatly reduced during the week.

Shippers of anthracite are complaining about the slow movement from the mines. Coal which ordinarily takes three days to reach this port has been consuming ten days or more, and the trade has considered itself lucky to get the fuel at all, in view of the present car situation.

The anthracite trade is talking seriously of further increasing prices. At a meeting held during the week, a majority of the largest operators favored an advance of 25c. per ton.

Buffalo, N. Y.

The activity in the bituminous-coal market has become so great that it is regarded as a sort of panicky situation, which is sure to be followed soon by much higher prices. This condition has been recognized by the Pittsburgh district, and select-lump prices have been marked up as high as $3 at Buffalo, which means that the Pittsburgh district is sold up and does not want any more business.

It is a long time since such a condition of independence has been reached, but it now appears to be well warranted. The consumer is alarmed over the outlook and is laying in coal as fast as he can get it, paying a good advance when necessary. The consumption is much larger than it was during the summer, and it has not reached the maximum yet. Whether the production can be increased much remains to be seen.

There is politics of many kinds in the air, but business is paying no attention to such side issues and is bound to make a big record from this time on. Buffalo is doing its full share of the industrial work. Every factory is running up to capacity and more are being established.

It is hard to put figures on the bituminous market, for every dealer has prices of his own and his own view of the future of the trade. One jobber asserts that he is getting $2.75 for Pittsburgh three-quarter and will not sell it on time short of $2.85, with spot mine-run at $2.60 and slack at $2.15. Coke is quite strong at $4.75 for the best Connellsville foundry.

The anthracite situation has been at its worst for some time, but shippers declare that the demand still increases faster than the supply. All sorts of premiums up to $1.50 a ton are freely offered. Some consumers are giving it up and buying bituminous and coke to burn in place of anthracite. No doubt the present rush of orders are duplicated, often more than once, but they are far in excess of the supply. Sellers of independent anthracite could do an immense business if they could get the coal, but as a rule they are getting only a little. Lake shipments from Buffalo for the week were 186,000 tons, which is fairly heavy.

Production is badly limited by the shortage of men. A Buffalo operator reports that he has just been able to get his output at one mine up to 20 cars a day, when if he had sufficient labor he could easily make the production 30 cars a day. The situation in this respect is steadily growing worse.

Columbus, Ohio

With a good demand for all grades of Ohio coal and a satisfactory tone prevailing, the trade is rather active. There is only one drawback to the market and that is the car shortage, which is following the course predicted by coal men earlier in the season. It is getting more difficult every day to get cars and dealers as well as steam users are clamoring for deliveries.

One of the strongest points in the market is the good domestic demand. Retailers in all parts of the country who are dependent on Ohio and West Virginia for their supply have been placing larger orders. Every effort has been made to stock up for emergencies, but dealers started too late and now they cannot accumulate stocks. Some West Virginia coal was stocked earlier in the year, and now Hocking is in demand for the same purpose.

Householders are buying in larger quantities and the severe weather of last winter has the effect of making private users lay in a larger stock at this time.

The steam business is rather active and since the steel and iron concerns have a better run of orders, the tonnage requirements are larger. There is also a noticeable improvement in the general manufacturing.

The car situation is so bad that operators and jobbers are discussing the probability of prices being boosted from the present schedule of $1.65 for Hocking and Pomeroy lump to $2, without any intermediate step of $1.75, which was believed to be the program for Oct. 1. It is now believed that the jump will be to $2, and dealers are urged to get in before the advance.

The Lake trade is still active and the tonnage shipped to the Northwest is as large as the limited car supply will permit. Chartering of boats is still going on and dock managers are urging the Ohio operators to ship as much coal as pos-

sible, as a coal shortage in the Northwest appears probable.

Production has been considerably cut down because of the lack of transportation facilities, and it is believed only about 50 per cent. of the normal output was mined during the past week.

Quotations in the Ohio fields are:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.65		$1.70	$1.65
2-in.	1.45	$1.20	1.50	1.40
Nut	1.15		1.50	
Mine-run	1.20	1.05	1.25	1.20
Nut, pea and slack	0.65		0.65	0.55
Coarse slack	0.55	0.70	0.55	0.45

Hampton Roads, Va.

The past week at Hampton Roads has been void of any special features. There appeared to be more cargo coal taken by steamers this week than usual, which condition is all the more satisfactory to local shippers as the steamers always require several hundred tons of bunker coal. The Navy Department have placed colliers this week for a heavy tonnage, presumably to be used in attending the assembling of 100 or more war vessels in New York Harbor, Oct. 12.

Outside, or spot, inquiries have not been so numerous during this week; hence no sales are reported at the new circular of $2.80. There is some talk of a $3 circular before many weeks. From the amount of contract tonnage reporting, producers here will not have many opportunities for availing themselves of the better prices. The dumping at Hampton Roads this month will approach the million mark.

Knoxville, Tenn.

Operators in the Jellico district, which fixes the price of domestic coal for this field are quoting September delivery as follows:

1½ in.	$2.00
3 in. and block	2.10
4 in. and block	2.15

For October delivery prices are quoted 10c. per ton higher, and it is believed that before Oct. 1, prices for that month will stand from 10 to 25c. per ton advance. The steam market shows a decidedly strong tone and operators are quoting and getting 5 to 10c. per ton more than a short time ago.

Companies on the Southern Ry. are already complaining of a shortage of cars. One operator stated that he had only sufficient cars to run two days this week while he had more orders than could be filled if he worked every day. At the present time everything points to one of the best seasons in many years. Operators seem confident of having all the business that they can comfortably accommodate and at a good price.

Indianapolis, Ind.

Trade is holding firm in Indiana and despite a few small strikes and a mine fire, the output, shipments and sales of coal during the past week were considerably in excess of the middle week of September a year ago. The fact that there is no disposition on the part of operators and dealers to cut quotations indicates a healthy condition and a conservatism that tends to keep down speculation and augurs well for a steady price and a good output at the mines.

Mines that were idle a week ago are now working, and it is freely predicted that the next payroll will be the largest in the history of the industry in the state. Encouraging reports are had from the manufacturing centers, and the operators are expecting the best business after Oct. 1 that they have had for years.

The car shortage is quite noticeable and fears are entertained lest it become serious. The Indiana Railroad Commission has sent out a warning to railroads urging them to prepare for moving the coal speedily and not wait until the congestion develops and requires heroic efforts to keep the business of the country supplied.

Detroit, Mich.

Bituminous—All the operators and dealers in this vicinity are most optimistic as to the future. The West Virginia strike is not being noticed at all at present and coal is coming in moderately well except the smaller grades, which are hard to get. Coals from the Ohio fields, which heretofore did not have a good market at this point, are now in great demand, and the Ohio operators will benefit from the unsettled conditions which exist in West Virginia. It is also rumored that Indiana coal will be used here extensively.

It is predicted by a large local operator that bituminous will never again be as cheap here as it has been. The demoralized conditions which existed a year ago, when the tracks were filled with coal that there was no possible way of disposing of, will never occur again. This appears logical because of the reconsigning charge and demurrage laws which are now in effect. It is now possible for the operator to sell his coal at the mines, instead of shipping it to the market and depending on some jobber to sell it on a commission or consignment basis.

The market is quite brisk and the prevailing prices are as follows, f.o.b. mines:

	W.Va. Splint	Pocahontas	Pittsburgh	Hocking
Domestic lump	$1.20			$1.65
Lump and egg	1.75	$2.50		
3 lump	1.25		$1.25	1.30
Mine-run	1.15	1.25	1.15	1.20
Slack	0.95	1.05		0.85

Anthracite—The sudden cold snap which this city is now experiencing has created an unusual demand for hard coal. The dealers find it impossible to take care of more than 25% of their regular business, owing to the fact that anthracite has been so slow in arriving, and in a great many cases the retail merchants are refunding money that has been paid them by the consumer because they find it impossible to fill their orders.

Coke—Consumers are cancelling their anthracite orders and substituting the same with coke, which can be used to great advantage for domestic purposes. Owing to the unusual demand for this product, the prices advanced 50c. a ton, until retail price is now $6.50. It is predicted that it will advance to $7 or $7.50. The coke manufacturers are refusing any more orders, claiming they have sold their output.

Chicago

Unusual strength along a number of lines has developed in the Chicago coal market. Premiums ranging between 10 and 50c. are being paid for smokeless coal. The small producers of Hocking have advanced the price to $1.65, with a tendency to charge $1.75 Oct. 1 next.

Circular prices on Franklin County and Carterville coal have been increased 25c. per ton. Smokeless mine-run is selling all the way from $1.35 to $1.60, the mines, with some dealers seeking even higher prices. Smokeless lump and egg commands from $2.35 to $2.50, the mines. There is a good market for screenings, even the poorest grade selling for 40c. Prices for higher grade screenings range between 60 and 80c. Prices for coke have also advanced.

Prevailing prices at Chicago are:

Sullivan County	
4-in. lump	$2.37@2.47
Egg	2.37@2.47
Mine-run	1.99½
Screenings	1.47@1.52
Springfield	
Domestic lump	$2.32
Steam lump	1.97
Mine-run	1.87@1.97
Screenings	1.27@1.32
Clinton	
Domestic lump	$2.27
Steam lump	2.12
Mine-run	1.92
Screenings	1.27@1.32
West Virginia	
Egg	$4.40@4.55
Mine-run	3.45@3.65

Coke—Prices asked for coke are: Connellsville, $5.40; Wise County, $5.15; byproduct, egg and stove, $4.85@5; byproduct, nut, $4.85@5; gas house, $4.85.

St. Louis, Mo.

The past week or so has seen more life in the coal market than since before the strike. Carterville coal has simply gone out of sight and every shipper is from three to five and six weeks behind on orders. The Carterville operators seem to be in considerably worse shape than the others, on account of the cars. Last week mines with Frisco and Iron Mountain connections got no Iron Mountain cars, and only eleven Frisco cars. If they would load company fuel, mine-run,

at $1.02½ per ton, the railroad would give them cars, but unless they did this they could get none.

The Standard operators are also feeling the car shortage, and Standard coal is at last commencing to bring a fair price. St. Louis is apparently outside of the zone that is receiving any anthracite, although a fair volume of smokeless is moving in.

An idea of the market, which is very changeable, is as follows:

Franklin County	
6-in. lump and 3x6 egg	$2.00@2.25
No. 1 nut	1.60@1.75
No. 2 nut	1.40@1.50
Screenings	0.55@0.65
Carterville	
6-in. lump and 3x6 egg	$1.85@2.00
No. 1 nut	1.40@1.50
Screenings	0.55@0.65
Mine-run	1.20@1.30
No. 1 washed	1.75@2.00
No. 2 washed	1.60@1.75
No. 3 washed	1.30@1.40
No. 4 washed	1.00@1.10
No. 5 washed	0.75@0.85
Big Muddy	
Lump and egg	$2.10@2.25
Trenton	
Lump and egg	$2.15@2.25
Mount Olive	
6-in. lump	$1.35@1.50
2-in. lump	1.25@1.39
Screenings	0.45@0.50
Standard	
6-in. lump	$1.20@1.30
2-in. lump	1.10@1.15
Nut	0.85@0.95
Screenings	0.40@0.50
By product coke	$5.00
Gas house coke	4.80
Smokeless	
Lump	$4.85
Egg	4.75

Minneapolis—St. Paul

Conditions in the anthracite business have not improved in the Northwest during the past week. The shortage at the docks is becoming quite serious and dealers have practically given up hopes and are turning in orders for the better grades of domestic soft coal.

Wholesalers ascribe the shortage to the fact that the strike has curtailed the production and that when mining was resumed the supply was given to the East. Then too, last winter was extremely cold and there were no stocks carried over as has been the case heretofore. These and various other facts are given to the dealer, but some still think it is merely the usual talk to create an active market.

A circular sent out by a number of Franklin County operators quotes Franklin County lump at $2. Carterville lump is selling for $1.60@$1.70. In fact, prices on all grades of Illinois coal are firm with the possible exception of the Springfield district, which is a little weak. Demand for threshing coal is about over except in the extreme northern parts of Minnesota and North Dakota.

The car shortage has not yet become serious with the dock people, as grain has been pouring into the head of the Lakes in train loads, and, of course, this gives the docks an ample supply of box cars. The Illinois and Indiana operations are not so fortunate and some are not working the mines even half time. Prices are rather weak on Eastern bituminous coals shipped over the docks, but the general belief is that quotations will advance before the first of next month if not sooner.

Production and Transportation Statistics

The Car Situation

In the fortnight ended with Sept. 12 there was a decrease of 18,370 in the number of surplus cars. As there were only 9750 cars out of use at the beginning of this period, there was a net shortage on Sept. 12 of 8620 cars. This is the first report of the American Railway Association since 1910, which has shown a net shortage.

The following table shows the surplus and shortage of cars on 175 roads on Sept. 12:

	Surplus	Short	Net Surplus
Box	7,906	22,837	14,931
Flat	1,285	3,182	1,897
Coal, gond. and hopper.	5,310	8,331	3,021
Other kinds	12,879	1,650	11,229
Total	27,380	36,000	*38,620

*Shortage.

On the corresponding date last year the net surplus of idle cars was 64,283. Two years ago it was 54,890, in 1909, 71,373, and in 1908 170,652.

Sault Ste. Marie Canals

Coal movement through Sault Ste. Marie Canals for the season to Sept. 1, short tons:

	1911	1912
Anthracite	1,226,515	926,926
Bituminous	8,116,034	8,063,094
Total	9,342,549	8,990,020

Island Creek Coal Co.

August output of Island Creek Coal was 190,000 tons, and of July, 187,000 tons. The first six months witnessed a production of 1,015,000 tons, a monthly average of 170,000 tons.

Foreign Markets

Great Britain

Sept. 13—Large coals are being offered at easy figures to buyers in a position to effect immediate shipment, but sellers continue to hold for firmer figures for shipment ahead. Small coals are less plentiful, pit stoppages curtailing the production. Prices are approximately as follows:

Best Welsh Steams	$4.02 @ 4.14
Best Seconds	3.96
Seconds	3.72
Best Dry Coals	4.08
Best Monmouthshire	3.60
Seconds	3.36
Best Cardiff Smalls	2.52
Seconds	2.46

The prices for Cardiff coals are f.o.b. Cardiff, Penarth, or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, both exclusive of wharfage, and for cash in 30 days—less 2½%.

Oriental Markets

Shanghai, China, Aug. 22

Japan—This market has been quiet since last writing and there has been no business done worth speaking about; there is no demand at the moment and we do not expect any until the autumn trade commences.

Prices locally are steady and stocks normal; stocks at Japan shipping ports are low as is usual at this time of the year after the mid-summer holidays in Japan when all the Japanese mines shut down for several days.

Manchurian Coal—No change to report here and the market is quiet, but we hope for some improvement in the autumn.

Kailan Coal—This market has been fairly active and a certain amount of new business has been concluded during the fortnight at quotations; otherwise stocks and deliveries are as usual.

German Empire

The production, imports and exports of the German Empire for the month of July, 1912, were, in metric tons:

	Production	Imports	Exports
Coal	15,779,105	1,212,173	2,733,473
Lignite	6,645,181	636,849	3,303
Coke	2,412,316	60,132	703,283
Briquettes	2,098,442	10,970	271,788

Financial Notes

Alabama Consolidated Coal & Iron Co.—The balance sheet of this company shows a surplus of $693,134 and available current assets of $577,699.

Pittsburgh Coal Co.—The Commerce Commission's recent decision in the Pittsburgh-Lake rate case, reducing freight charges on coal, resulted in a benefit to this company of 10 c. per ton, which, on last year's output of 16 million tons, is equal to $1,600,000 a year. This is, however, cut in half by the increase of 5c. a ton in wages to the miners.

Reading Co.—To pay the full dividends on the two classes of the preferred stock of this company requires $2,800,000 per annum, but it is further necessary to arrange for the general mortgage sinking fund which requires about $500,000 per year. Dividends at 6% per annum on the common, aggregate $4,200,000 per year which makes a total annual requirement of $7,500,000.

Cape Breton Coal, Iron & Railway Co. (Ltd.)—The recent bond issue of this company will be secured by the mortgage dated Sept. 1, 1908 and a supplemental deed on all lands, buildings and other immovable property. Bonds will be redeemed by the company on July 1, 1942 at par or not later than Jan. 1, 1932 at 107 on three months' notice. Beginning Jan. 1, 1914 there will be set aside as a sinking fund, out of any available profit, 10c. per ton on the coal upon which royalty is paid for the retirement of these bonds at or under 107.

Paint Creek Collieries Co.—The capital stock of this company authorized and issued amounts to $5,000,000 and about 98% of it was purchased about Jan .1, 1911, by the Lackawanna Coal & Lumber Co., a West Virginia corporation, at $20 per share, payment being made in Lackawanna Coal & Lumber Co., consolidated, 6%, 50-year bonds, at par. These bonds are held by F. W. Woolerton, trustee, of Scranton, and receipts are given for the deposited stock, the accruing interest on the lumber six's to be paid to the receipt holders, interest accruing after Jan. 1, 1913. The Lackawanna Co., through ownership of the stock, operates the 12 tipples of the Paint Creek Collieries Co.

Throwing The Searchlight On Advertising

Little Talks on a Big Subject for Coal Age Readers

By the Ad. Editor

A belting salesman, who travels for a well known concern, came into our office the other day on a friendly visit.

In the course of our conversation the talk drifted around to the subject of getting a customer's confidence.

"When I call on the superintendent or engineer of a coal mine," said the salesman, "the first thing I aim to do is to get the man's confidence established in me and my goods.

For instance, I carry a sample piece of belting with me which I pull out of my pocket and hand to the Super with the statement that it's twelve inches long and four inches wide. Then I pick up his rule and measure it and he sees that it is *exactly* twelve by four inches.

Then I tell him that this is a double belt that he can't pull apart and I make him try it. He finds that his strength is useless, that the belt *won't* pull apart—and so on.

Everything I tell him I prove before his eyes and as a result, he involuntarily comes to see that I am dealing in truth and not hot air. Then I have his earnest sincere attention and finally his complete confidence.

And nine times out of ten he buys my belt and finds that it does what I said it would—then I've got a good customer for years to come."

Here was a chance to get a good opinion of advertising straight from a salesman who is out in the field where the ads are read, so we asked—

"But in advertising your goods, don't you think a little exaggeration, a little stretching of the actual truth about the belt is a good thing—to attract attention?"

"It's a good thing if your concern wants to go out of business—that's all. Honest advertising is a big help to any salesman, but the other kind is the biggest stumbling block you can put in his way. Why everybody reads the ads nowadays and if your concern exaggerates in its claims, the salesman is hailed as a fakir everywhere he goes. He has to *overcome* the effects of the advertising before he can get a look-in.

But there are mighty few advertisers these days who are fools enough to monkey with the confidence of their customers."

And as the poet says, "there you are."

Advertising is a tremendous "influencer" because it's truthful and because you readers know it's truthful—and the advertisers, if there are any left, who don't realize that fact are on the road to that haven of rest—"the hands of the receiver."

It pays to advertise only because it pays to buy advertised goods